OCTOBER 1955

VOLUME 4, NUMBER 10

Battelle Technical Review

IN THIS ISSUE:

Scarce Metals in Modern Technology

TECHNICAL DIRECTOR – FRANKFURT

MAX A. W. BARNICK

European industry, like American industry, has not always been fully aware of the advantages of contract research in solving industry's technical problems. Indeed, at the time Battelle established a research center in Frankfurt am Main, in 1953, many European industrialists were skeptical of the value of an organization that would undertake the investigation of a broad range of problems. But Max A. W. Barnick found himself in agreement with Battelle's belief that contract research could be useful to European industries and could help them to become more competitive.

Now technical director of Battelle Institut e.V., in Frankfurt, Max was the first German technical man to join the staff there. Since becoming affiliated with Battelle, in March, 1952, (the laboratory opened in October, 1953) he has played a key role in the establishment of the first not-for-profit contract research organization in Europe. During that time, he has met with industrial leaders to explain the Battelle philosophy of service through science and its plan of operation. He has also sought to learn how the Institute could best serve the needs of various industries. One of his important responsibilities has been to help plan the services that the Institute provides.

Previously, Max had served as chief chemist and head of the department of metallurgical physics of the Bayerische Motorenwerke. There he was responsible for the investigation of problems relating to air- and liquid-cooled aircraft engines, jet engines, and rocket motors and to guided missiles. Earlier, he had carried on fundamental research on problems of reaction in the solid state with Professor Eitel at the Kaiser Wilhelm Institute for Silicates (ceramics) and with Professor Hanemann at the Institute of Metals of the Technische Hochschule in Berlin. Two years' experience in technical associations, which followed six years of service as professor in various universities, made him familiar with research administration and coordination problems.

Max received his technical education in chemistry, physics, and chemical technology at the Technische Hochschule of Berlin and at the University of Berlin. He received his diploma in chemistry and his Ph.D. from the latter institution.

Away from the Institute, Max's interests center in the nonscientific fields of modern languages, literature, philosophy, and the history of the fine arts. Together with his wife, who is an archaeologist, he also enjoys photographing foreign scenes, usually of archaeological interest.

Volume 4, Number 10
October 1955

BATTELLE TECHNICAL REVIEW

Dedicated to the dissemination of knowledge. Published monthly by Battelle Memorial Institute, an endowed foundation serving mankind through science and technology.

Published monthly by Battelle Memorial Institute. Please address all correspondence about articles, abstracts, subscriptions and exchanges to: The Editor, Battelle Technical Review, Battelle Memorial Institute, 505 King Avenue, Columbus 1, Ohio. Accepted as controlled publication at Columbus, Ohio. Printed in the U. S. A.

contents

Technical Director—Frankfurt . Inside front cover

The Applied Scientist 123
An Editorial

Electron Diffraction Camera 124

Scarce Metals in Modern Technology . . . 125
by CHESTER T. SIMS
The search for very special and improved materials has brought to light promising properties in many of the scarce metals.

Hoover Commission on Research 133

Notes from Battelle 135
Reports on research activities and developments of interest to science and industry.

Writings by Staff Members . . Opposite Page 136
Papers and articles prepared by members of the Battelle staff that have appeared recently in books and periodicals.

Battelle Technical Review Abstracts 575a
Abstracts of articles from more than 1200 American and foreign journals in a wide variety of technological fields.

The Applied Scientist

THE SCIENTIST IS USUALLY pictured as a person dedicated to the search for truth—motivated by a high order of curiosity—and having profound respect for knowledge. These are traditional qualities, which together with modesty, tolerance, intellectual integrity, and humility describe the basic scientific personality. But, in the applied scientist of today we find "added" qualities that are also important to his calling.

One of these is business understanding. The tremendous growth in the application of science to industry that has occurred in the past two decades has increased the dollars spent on research manyfold—in the United States some twenty times. Most of this research has practical objectives, and it has led to the development of a realistic outlook and business objectivity in the research man. He has therefore become conscious of costs, has learned to work on a budget and against time, and has developed ability in determining what is economically as well as technically feasible.

Cooperativeness is another added quality. Since applied research is usually the work of a team, the applied scientist almost always works with people. This means that he must know how to get along with people, must be willing to give and take, must have social tact. Understanding people is just as important to the applied scientist as understanding mathematical or chemical symbols, since he deals with both.

Salesmanship is a third trait added to the personality of the applied scientist. This is essentially the ability to sell ideas, to organize thoughts so as to communicate and stimulate favorable responses from others. It includes the ability to transmit ideas to associates and subordinates as well as to superiors. Salesmanship in a scientist always means the logical organization and presentation of facts—never flamboyancy or device in order to gain psychological advantage.

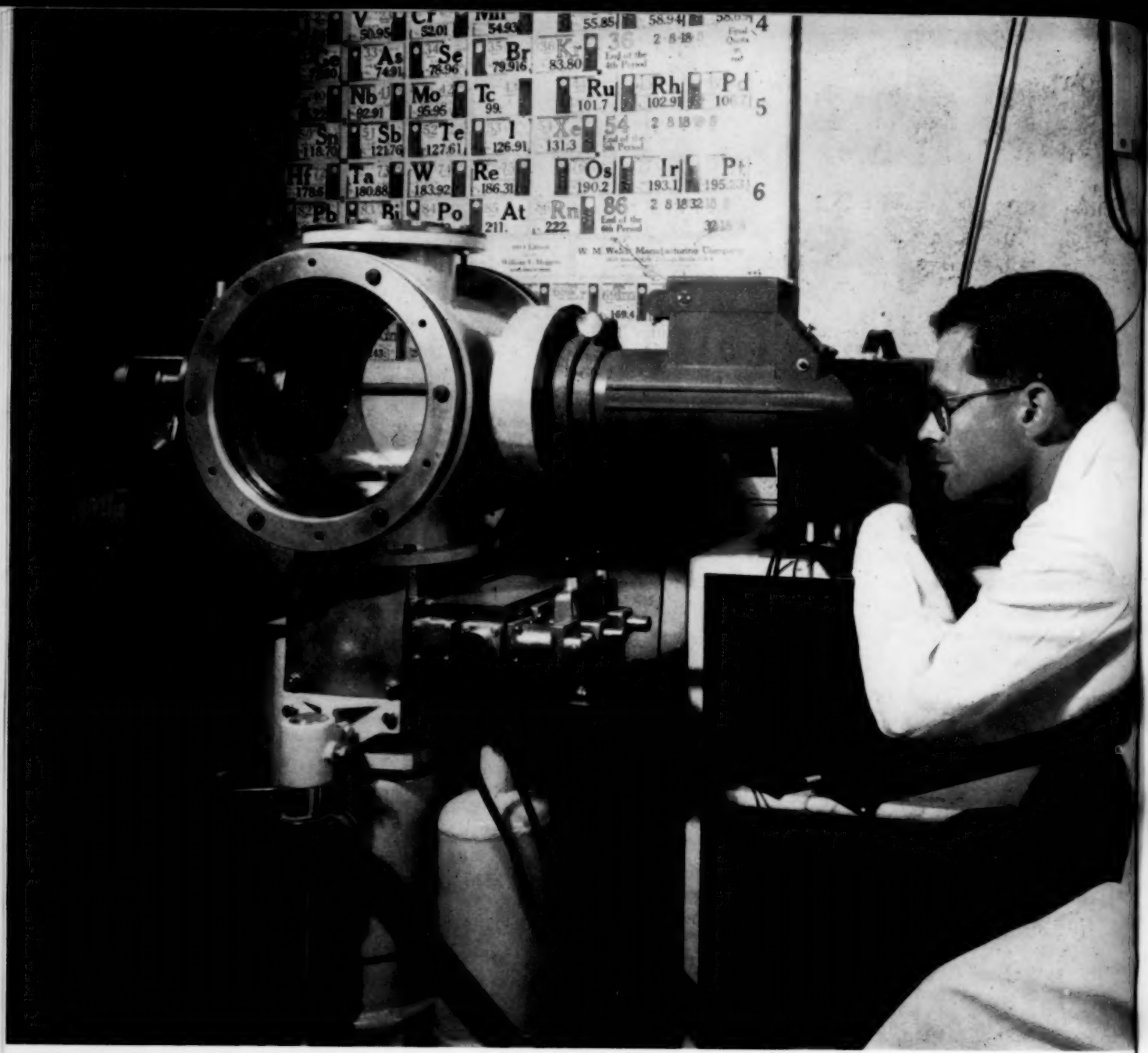
Other qualities, superimposed upon the basic scientific personality to make the applied scientist, include "drive", patience, and a degree of aggressiveness. The applied scientist may be said to be aggressive to the extent that he provokes or initiates constructive action and keeps it dynamic.

Thus, the applied scientist with this traditional dedication to truth and knowledge, with his modesty and humility, and with his cooperativeness, appreciation of business values, salesmanship, drive, and constructive aggressiveness, is an extremely complex personality. He is the link between knowledge and its use and thus one of the most important of our social assets.

The applied scientist as a personality is more prevalent in the United States than in any other nation, because applied research has been advanced further in this country. However, in all of Europe and the Americas, and certainly also in many parts of Asia, applied science is coming to the fore. Soon this personality type, which stands midroad between fundamental science and industry and commerce, will become prevalent throughout the world. A harbinger of better things for mankind, his numerical increase is awaited by the world's people.

Clyde Williams

President and Director, Battelle Memorial Institute



ELECTRON-DIFFRACTION CAMERA

The electron-diffraction camera may be used to study the surface structures of such materials as metals, ceramics, and glasses. The camera shown here is being operated at the Battelle laboratory in Geneva. Specimens are placed in the large glass-enclosed specimen chamber. Electrons from the electron gun, at the extreme left of the equipment, are focussed on the surface of the materials by means of magnets. The resulting pattern can be viewed on a fluorescent viewing screen or photographed for purposes of record.

Scarce Metals in Modern Technology

The search for very special and improved materials has brought to light promising properties in many of the scarce metals.

by CHESTER T. SIMS

THE INTENSIFYING DEMANDS FOR specialized and improved materials is leading metallurgists to investigate more closely the properties of all available metals. In keeping with this trend, more and more effort is being expended upon the investigation of the relatively unknown metals to determine their possible usefulness for alloying agents, electronic materials, nuclear applications, and for other purposes. Research has led to some interesting discoveries about the potential values of many of the so-called "rare metals"; and it has also demonstrated that these metals show high promise of wider future usefulness in helping to solve many of the materials problems facing industries.

The term "rare metals" has been extensively used and has had many meanings in the past. To avoid confusion, it is suggested that the term "scarce metals" be used to designate those metallic elements which are useful and well known, yet whose production is relatively low. To establish a firm basis for classification, it might be wise to define scarce metals as those whose yearly production falls under 100 tons, but is over 100 pounds. This excludes such metals as manganese, cobalt, titanium, columbium, and many others on the basis of high production. Since most of these latter metals are now commonly used in technology, it follows that they should not be termed scarce metals. On the other hand, most of the metals whose yearly production is less than 100 pounds have very little really practical value and may be properly considered as laboratory curiosities. This leaves a group of about fifteen metals, most of which have great practical and economic value, but are sufficiently rare so that their use is limited to applications which may require a small amount of the metal. Radium, which is very widely used because of its radioactive properties, would normally fit nicely in this classification, except that its production is below 100 pounds per year.

These elements, recorded on page 126, come from virtually every section of the periodic system. Nevertheless, they fall into about five general classifications. The first metal listed, cesium, is a light metal, so-called because of its low density of 1.9 g/cc. It may also be grouped with gallium, indium, and thallium, members of the large group of low-melting metals. Cesium and gallium actually become liquids on hot days; indium and thallium also melt at rather low temperatures. Rhenium, thorium, and hafnium may be grouped together as they represent the transition metals, a group of elements which comprise about 50 per cent of the periodic system. Thorium is also one of the most common members of the "rare earth" family of elements, which compose a large subgroup within the transition metals. Ruthenium, rhodium, and palladium are known as the first triad, or "light" group of the precious metals. The second triad, or "heavy" group is composed of osmium, iridium, and platinum. All six are often called the "platinum metals". Tellurium, the least valuable and apparently the least wanted of the scarce metals, is called a semiconductor because of its

Chester Sims joined Battelle in 1947 to carry on investigations in the fields of corrosion and inorganic chemistry. Later he transferred to nonferrous physical metallurgy research, concentrating on high-temperature materials. This has involved studies in powder-metallurgy work on rhenium, molybdenum, and other uncommon metals. He is one of the key men in current Battelle investigations of rhenium, his contributions being particularly in the evaluation of the metal's properties and the development of fabrication methods. Sims has written a number of articles on this work. He received his B.S. in chemical engineering from Northeastern University and also holds an M.S. in metallurgical engineering from The Ohio State University.

DATA ON SCARCE METALS

Metal	General Classification	Principal Sources	Approximate World Production,[1] Tons/Year	Approximate Cost, as pure metal, Dollars per gram	pound
Cesium	light low melting	Africa, United States	30	0.50	225[2]
Gallium	low melting	United States, England, Europe	0.25	3.00	1500
Germanium	semiconductor	Africa, United States	5-10	0.70	300
Hafnium	transition	United States, Australia,	..	..	..
Indium	low melting	Europe, Asia North America	7	0.75	350
Iridium	precious	Canada, S. America, USSR, Africa	0.4	3.50	1500
Osmium	precious	Canada, S. America, USSR, Africa	0.2	3.50	1500
Palladium	precious	Canada, S. America, USSR, Africa	12	0.65	300
Platinum	precious	Canada, S. America, USSR, Africa	12	2.50	1100
Rhenium	transition	United States, Germany, USSR	1	2.25	1000
Rhodium	precious	Canada, Africa, USSR, S. America	1	4.00	1800
Ruthenium	precious	Canada, Africa, USSR, S. America	0.5	1.75	800
Tellurium[3]	semiconductor	United States, Europe, Australia, Canada	35	0.003	1.75
Thallium	low melting	United States	20	0.02	12.50
Thorium	transition	United States, India	..	0.75	350

[1] Production is in any form, but reported as tons of contained metal.
[2] Reported as cost of cesium salts.
[3] Although tellurium is usually termed a metal, many of its properties are similar to those of nonmetals like sulfur and selenium.

high electrical resistivity and also because of its many resemblances to such nonmetallic elements as sulfur, selenium, and oxygen. A much more valuable semiconductor metal is the element germanium, widely known for its extensive use in the electronics industry.

Sources and Production

The scarce metals are obtained from all of the earth's continents, although the table indicates that the North American continent is prime producer when the group is considered as a whole. For instance, Canada and the United States combined produce about 45 per cent of the world's supply of the precious (or platinum) metals. South Africa produces about 30 per cent and the Soviet Union an estimated 15 per cent.

Although it is estimated that platinum is about twice as abundant as palladium in the earth's crust, the present-day production of the two metals is about equal. The other members of the precious metals group are produced in much smaller amounts and are correspondingly more expensive. Since all of these metals are extremely corrosion resistant and their scrap is very valuable, recovery following use is practiced extensively. The large amounts of scrap retired for reprocessing annually, with subsequent resale as new

metal, affects the amount of virgin metal produced. Since platinum is considerably more corrosion resistant and valuable than palladium, its subsequently higher rate of retirement into reclaimable scrap may account for the discrepancy between the natural abundance and present-day production statistics of the two metals.

Two of the low-melting metals, cesium and thallium, are produced in appreciable tonnage each year. Cesium, which is mainly a product of Southwest Africa, is very expensive despite its relatively high production. In comparison, thallium, which is mined domestically, costs only about 2 cents a gram. Gallium, a third member of the group, is produced as a by-product in the United States, and to a lesser extent in other sections of the globe. The other low-melting metal, indium, is also produced principally in the United States and Canada. Peru is an important source, but only produces about 20 per cent as much as the North American countries combined.

Three transition elements, rhenium, hafnium, and thorium, are considered to be scarce metals. Of these, rhenium is available from the United States, Germany, and the Soviet Union. Although production in the United States has just commenced on an appreciable scale, rhenium has been available from the other sources for many years. Its cost approximates that of the precious metals. Production of thorium is difficult to estimate because of its importance in nuclear technology, although about 25 tons were used for nonenergy purposes in the United States in 1950. Present world production is probably several times that figure. The most important source of thorium, which usually occurs with other rare earth metals, is in India.

Actually, some of the other rare earth metals besides thorium may fall in the classification of scarce metals also. However, two of the well-known rare earth elements, lanthanum and cerium, are produced at a greater rate than 100 tons per year. Other rare earth metals are often not separated one from the other, but used commercially as "misch metal". Hafnium, found in zirconium concentrates, comes from almost every continent of the globe except Africa.

Tellurium, called a "semiconductor" because of its very low electrical conductivity, occurs in widely scattered deposits throughout the world, often associated with gold. At about $1.75 per pound, it is by far the least expensive of all the scarce metals. It is quite abundant, but costs little because of low demand and because of availability as a by-product from copper refining; if demand increased, the metal might be produced at a higher rate than its present tonnage. Further, tellurium might then bring a higher price. In sharp contrast, the other rare semiconductor, germanium, is in relatively high demand. Its primary source is the United States, but recently extensive African deposits have been revealed. Germanium is a vital metal to the electronics industry, and sells at the moderate price of $0.70 per gram.

Characteristics and Applications

As evidenced by their scattered occurrence in the periodic system, the characteristics of the scarce metals are extremely varied. A few of the more common physical properties are summarized on page 130 for comparison purposes.

Low-Melting Metals

In addition to these basic physical properties, the scarce metals possess many interesting characteristics that cause demand for them in technical applications. The low-density and low-melting metal cesium, for instance, is not in demand as a result of these obvious physical properties. Cesium has a low thermionic work-function at room temperature, which makes it ideal for use as an emitter of electrons in photoelectric cells. In addition, its high affinity for oxygen makes it useful as a "getter" to clean up gaseous impurities in vacuum tubes. Like most of the other scarce metals, cesium occasionally finds use as a chemical catalyst, especially in the polymerization of resinous materials.

The three other metals that have been classified as low melting are gallium, indium, and thallium. Part of the demand for the first two is a direct result of their unique melting points. Gallium was first used like mercury as the indicator fluid in high-temperature quartz thermometers. This type of usage has not been wide-spread, although in the last few years gallium and its alloys have been investigated for use as heat-exchange fluids in nuclear-power reactors. Gallium has a low vapor pressure which is very beneficial in this use, but it is also very corrosive, rather expensive, and has not yet been used successfully in this application. Other minor uses for gallium are as a catalyst, phosphor exciter, dental alloy ingredient, and cancer treatment material.

Indium, which is very similar to gallium chemically, but possesses a higher melting point, has much broader use than production figures suggest. Alloys prepared for very-low-melting purposes usually contain indium in amounts up to 25 per cent. These alloys are used in such applications as heat-sensitive safety plugs. Indium also increases the wettability and strength of solders, and has been used in sleeve bearings plated

USES FOR SCARCE METALS

Uses	Light Metal	Low-Melting Metals			Semiconductors		Transition Metals			Precious Metals					
										Heavy Group			Light Group		
	Cesium	Gallium	Indium	Thallium	Germanium	Tellurium	Rhenium	Thorium	Hafnium	Ruthenium	Rhodium	Palladium	Osmium	Indium	Platinum
Electrical wires and filaments	..	..	..	..	..	..	O	O	X	..	X	X	O	O	X
Electrical contacts	..	..	O	..	..	..	X	..	O	X	X	X	X	X	X
Spark plugs	..	..	..	..	..	..	O	..	O	..	X	..	O	O	X
Thermocouples	..	..	..	..	..	..	O	..	O	..	X	..	..	..	X
Electron emission	X	..	..	..	..	..	O	X	O	..	..	..	O	..	..
Semiconductors	..	X	X	..	X	..	O	..	..	..	..	..	..	..	..
Electroplates	..	O	O	..	..	..	O	..	..	O	X	X	O	O	X
Corrosion resistance	..	..	..	..	..	O	O	..	..	..	X	X	..	X	X
Glass and rayon spinnerettes	..	..	..	..	..	..	O	..	..	..	X	..	O	X	X
Laboratory ware	..	..	..	..	..	..	..	..	..	..	..	X	..	X	X
Refractories	..	..	..	..	..	..	..	O	..	..	..	..	..	..	..
Additions to nonrare alloys	..	..	O	..	..	X	..	X	..	..	..	..	..	X	..
Dental alloys	..	..	X	..	..	O	..	..	..	..	..	X	..	..	X
Wear resistance	..	..	..	..	..	..	X	..	..	X	X	..	X	O	X
Low melting alloys	O	X	X	O	..	..	..	..	..	..	..	..	..	..	..
Thermometers	O	X	..	..	..	..	..	..	..	X	X	X	..	X	X
Jewelry and decorative	..	..	..	..	..	..	..	..	..	X	X	X	..	..	X
Catalysts	X	X	..	O	O	..	X	..	..	..	..	..	..	..	..
Medicine	..	..	X	X	..	..	O	..	..	..	..	..	..	..	..
Nuclear energy	..	O	O	..	..	..	..	X	X	..	..	..	..	..	..
Radioactive	..	O	..	..	..	..	..	..	..	..	..	..	..	..	..
Bearings	..	..	X	..	..	..	..	..	..	..	..	..	..	..	..
Glass sealing	..	..	X	..	..	..	O	..	..	..	..	X	..	..	..
Light sensitive	..	..	O	X	..	..	..	..	..	..	..	..	..	..	..
Lubricants	..	..	O	..	..	..	..	..	..	..	..	..	..	..	..
Rectifiers	..	..	..	..	O	O	..	..	X	..	..	..	..	..	..
Insecticides	..	..	..	X	..	..	..	..	..	..	..	..	..	..	..
Vacuum "getter"	X	..	O	..	..	..	..	..	..	..	..	..	..	..	..

X Present uses — O Potential uses

on lead over a base of metals such as silver or copper. The latter, in turn, are backed up by steel, and the indium coating is diffused into the lead to improve its corrosion resistance. However, the use of indium in bearings has fallen off markedly in favor of cheaper alloys.

Thallium metal finds little or no use in the pure or alloyed form, but has several applications as a compound. It is used principally as thallium sulfate in rodent and insect control. An interesting and unusual use for thallium is as synthetic halide crystals for transmission of long-wavelength infrared radiations.

This property is utilized in spotting scopes for nighttime infantry sniping, and also for nighttime military signaling. These properties have been adapted to civilian use, and thallium salts are now used in infrared achromatic lenses and as components for infrared spectroscopy and microscopy.

Semiconductor Metals

The applicability of the two rare semiconductor metals, tellurium and germanium, are very different from one another. While the semiconductor properties of germanium have been widely exploited, tellurium has been bypassed when these characteristics are considered. It has been investigated for use as a high-temperature rectifier, but this application has not yet worked out. Instead, tellurium is primarily used as a minor additive in metallic alloys and to rubber. It greatly enhances the machinability of pure copper, while lowering copper's valued electrical conductivity only very slightly. In copper-bearing alloys such as brass and bronze, it is again used to increase machinability and also to increase strength and corrosion resistance. When added to cast iron, it induces "chill" during casting and is also used with magnesium as a spheroidizer in the preparation of ductile cast iron. Tellurium acts as a vulcanizing agent when added to rubber.

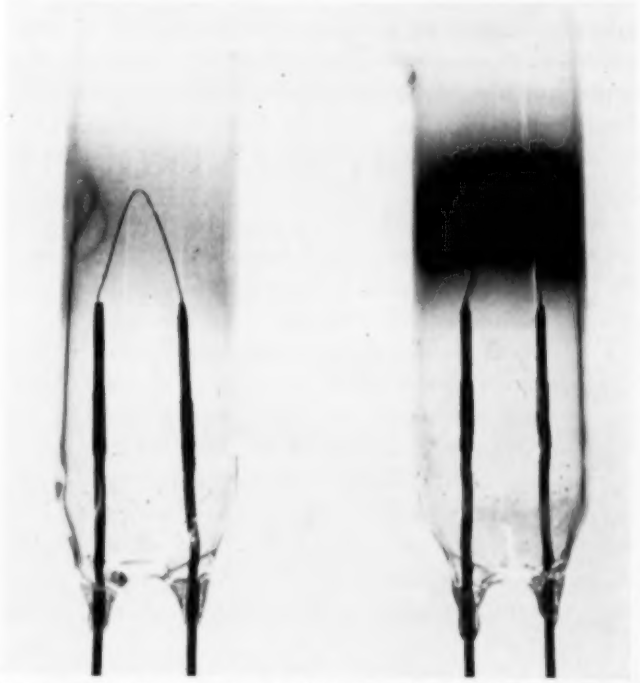
In contrast to these uses of tellurium in the large-volume metal industries, germanium has been utilized mainly in an industry concerned with very delicate devices. This is the solid-state devices industry, and its recent growth has coincided with the increased use of germanium. Germanium first was used for diode crystal rectifiers, tiny devices consisting of small germanium disks, each in contact with a fine wire of an appropriate metal. The entire assembly is about the size of a pencil eraser. It has many advantages over the vacuum tube diode in certain functions. About 10 million crystal rectifiers are manufactured annually.

Development of the germanium diode during World War II was followed by the introduction of the point-contact-type transistor in 1948. The latter, which is a germanium triode, is similar to a diode but has two wires making contact with the germanium wafer. A further and very important development has been the appearance of the junction-type transistor. This device, consisting of a block of germanium which has been carefully treated so that its ends possess different properties from its center, operates through area effects rather than the point effects described above. Germanium transistors and diodes can replace vacuum tubes in applications such as amplifiers and oscillators, and can also function in some applications where vacuum tubes are unsuited.

Transition Group

Three of the scarce metals, rhenium, thorium, and hafnium, have been classified as members of the large transition metal group (the precious metals are also transition metals, but are considered as a separate subgrouping). Rhenium has little in common with thorium and hafnium, chemically or metallurgically.

Rhenium is the highest melting and one of the most dense of the scarce metals. It properties have been extensively investigated recently with the ultimate objective of developing uses for the metal, which is now known to occur natively. Although commercial production has just commenced, rhenium is finding ready application in electrical contacts and as a construction material in electron tubes. Rhenium is a tough, corrosion-resistant refractory metal that forms a unique conducting oxide when in service as an electrical contact. It is particularly suited to marine and to certain high-temperature types of service. In addition, its high resistance to the "water cycle" (a deleterious phenomenon occurring in moderate vacuum which causes material transfer from a hot filament to the colder surrounding wall) bodes well for its use in electron tubes. The effect is compared with tungsten in the



Evacuated tube, showing in "black and white" the relative resistance of rhenium (left) and tungsten (right) filaments to the "water cycle". Heavy blackening around tungsten filament is tungsten cycled to glass tube. Slight graying around rhenium wire is probably impurities.

illustrated U-tube, where the glass wall surrounding the rhenium is relatively clean. Rhenium has also been used for pen points, filaments for evaporation of liquid metals, and as a catalyst.

Thorium, another transition metal, finds nonenergy application as a metal, and also as the oxide, ThO_2. In addition, it is a prospective fuel for nuclear reactions, which use may far outstrip other more common applications. Figures on the actual production of thorium are not available, but it is probably one of the more common of the scarce metals, and may possibly be out of the limits drawn here for scarce metal production. The nonenergy use of metallic thorium has been mainly confined to gaseous discharge lamp filaments. Thorium oxide has a wider scope of use, and has found considerable application as an incandescent gas mantle. Another of its more important uses is as an additive to incandescent tungsten filaments, where it controls grain size to reduce burn-out. In addition, thorium oxide is added to tungsten to lower the work function in thermionic emission applications. It is also used in other electronic applications, and because of its very high melting point, has limited use as a high-temperature refractory.

On the other hand, hafnium, which is now available in limited quantities, has but few uses. It has been investigated for use in X-ray tubes, rectifiers, and other electronic devices. It has also been suggested as an alloying ingredient in resistance heater wires. However, lack of complete information concerning its properties has severely hampered development. Formerly, the difficulty of separating the metal from zirconium, with which it occurs, was cited as the main cause of this; recently these processes have been improved as a result of the need for low-hafnium zirconium metal for nuclear-energy purposes. Preliminary information indicates that hafnium has interesting physical properties, and it is expected that as more becomes known about the metal, its use will increase.

Precious Metals

The platinum, or precious, metals are one of the better-defined groups in the periodic system. The properties of the member metals are quite similar in that generally they are high melting, ductile, and corrosion resistant. Their pleasant appearance and nobility, as with gold and silver, have brought about exclusive use in the jewelry industry, which has undoubtedly contributed to the use of the term "precious". However, their industrial and scientific importance far transcends their use as decoration. Platinum, the most plentiful precious metal and the most corrosion resistant of all metals, is used pure and alloyed for thermocouples, resistance devices, furnace windings, crucibles, filaments, electrodes, vacuum tube construction materials, catalysts, and many other less common devices. In addition, it is widely sought for electrical contacts, spark plugs, spinnerettes in the organic fiber industry, and in dental metallurgy. Fortunately, the corrosion resistance of platinum is a large factor in its economy. Hundreds of pounds of platinum are reclaimed each year, and the world sup-

PHYSICAL PROPERTIES OF SCARCE METALS

Metal	Atomic Number	Atomic Weight	Density g/cc	Melting Point C	Melting Point F	Electrical Resistivity ohm-cm x 10^6
Cesium	55	132.9	1.9	28	82	18.8
Gallium	31	69.7	5.9	30	86	56.8
Germanium	32	72.6	5.3	958	1757	60 x 10^3
Hafnium	72	178.5	13.1	2000	3530	32.4
Indium	49	114.8	7.3	156	314	8.4
Iridium	77	193.1	22.5	2554	4449	5.3
Osmium	76	190.2	22.5	2700	4892	9.5
Palladium	46	106.7	12.0	1554	2829	10.8
Platinum	78	195.2	21.5	1774	3224	9.8
Rhenium	75	186.3	21.0	3180	5756	19.5
Rhodium	45	102.9	12.4	1966	3471	4.5
Ruthenium	44	101.7	12.2	2500	4352	7.6
Tellurium	52	127.6	6.2	450	842	20 x 10^4
Thallium	81	204.4	11.8	300	572	18.0
Thorium	90	232.1	11.7	1840	3344	18.6

ply of platinum is increasing because of the very low loss rate.

Properties of the other metals of this group differ somewhat from platinum. Most are less corrosion resistant, and while platinum is one of the easiest of metals to fabricate, osmium, iridium, and rhodium are very difficult to work. In fact, osmium is presently considered totally unworkable, as it is brittle even at very high temperatures. Nevertheless, all of the precious metals are dense, high melting, and corrosion resistant as a group. All of them have been used in electrical-contact alloys and most of them have some corrosion-resistant application. Osmium is used in phonograph needles and pen tips, often in combination with iridium as a naturally occurring alloy called osmiridium. Iridium, like ruthenium and rhodium, is used to harden platinum, which is too soft and ductile to be used for items like spinnerettes and jewelry mounts in the pure state.

Rhodium-platinum alloys are very common and very popular. The well-known platinum-10 per cent rhodium alloy is used in such widely varying applications as thermocouple elements, equipment for use in the extrusion of glass, catalysts, and high-quality spark plugs. Electroplated rhodium is becoming increasingly important, and is used in this manner in reflectors for search lights, as a final coating in jewelry and so forth. Ruthenium is also primarily used as a hardening element for platinum. Platinum-ruthenium alloys are well-known in the electrical contact field where they are employed in devices such as aircraft magnetos.

Palladium, which is the least dense and the least expensive of the precious metals, is also one of the most workable. It is very similar to platinum in a chemical sense and, next to platinum, has the widest variety of uses of the precious metals. Palladium and its alloys are in constant demand as contact materials, for use as dental alloys, and as a decorative leaf. It is also used as a catalyst in the preparation of antibiotics and vitamins.

The uses of the precious metals, along with all of the other scarce metals are summarized in the table on page 128.

Scarce Metals Potential

Although the total yearly production of the scarce metals is only about 150 tons, they form a very important segment of today's technology. Economically, the scarce metals industry is also important, with a yearly production valued at well over $125 million per year—about a million dollars per ton. Both the economic and technical importance of this group of metals is certain to increase as research brings new uses to light. The increasing complexity of technical progress is creating a growing demand for materials with the special properties possessed by the scarce metals.

In the case of germanium, the platinum group metals, and thorium, this fact is particularly true at the present time and the limited supply keeps demand and price high. Thus, there is no apparent need for studies of these metals with a view to increasing their usefulness; instead, conservation devices may be warranted occasionally to conserve their supply. However, silicon is becoming increasingly important as a transistor material, and may encroach on the domain of germanium causing a relative surplus of the latter metal.

Several of the metals suffer from a vicious cycle. There is no demand for them because the price is overly high and because their properties have not been sufficiently revealed to create a desire for the metals in some specific application. No one has been interested in the properties, and less expensive preparation methods have not been investigated because of the low demand. In these cases, the government often assists in a beneficial and benevolent manner by sponsoring basic research, the results of which are available to the public and serve to stir interest in the metal. This has been particularly true in the case of the scarce metal rhenium. Two years ago it was virtually unknown and available only in very limited laboratory quantities as a metal powder. In recent Air Force-sponsored investigations at Battelle, its basic physical, mechanical, and electronic properties were determined, which served to reveal its excellent capabilities as an electrical contact material and electronic filament material. Rhenium may now be ordered in any common solid fabricated form commercially, is finding increasing industrial acceptance as a contact material, and studies are proceeding in its filamentary applications. It is rapidly becoming an important cog in our economy because its technology received a well-needed push from an interested sponsoring agency.

Cesium, gallium, hafnium, and indium are in various stages of this type of development today, although none are expected to have as sharp a rise from obscurity as was experienced by rhenium in the last two years.

Cesium has an ever-growing future based on radioactive properties, while gallium will find applications based on many different properties. Indium is becoming increasingly important in the electronics field. All

of these metals are available in reasonable quantities at the present time, and the increasing demand will unfold slowly.

Tellurium and thallium, on the other hand, suffer from the sickness of overproduction. They are generally available as by-products of other metallurgical operations, and in many areas, tailings and sludge rich in these metals have accumulated, unwanted for lack of a paying market. This is reflected in the relatively low price of the metals, tellurium at about $2.00 per pound and thallium at $12.00 per pound. However, evaluations of the situation have been made and current technical investigations may soon create new uses for these two previously unwanted scare metals.

That more tonnage of the scarce metals as a group is not produced annually is due to a combination of natural scarcity and difficulty of separation. Since demand for these metals seems to be increasing, it is doubtful that their prices can be expected to drop appreciably, even if much larger concentrations of some of the individual metals are uncovered. Rather, it can be expected that the price of the more inexpensive metals, thallium and tellurium, will increase as more uses are found.

Thus, with only slight exception, the general picture of the group of elements known as the scarce metals is one of healthy growth and continued expanding contributions to our increasingly complex technology.

⧖

"Maintaining the economic growth of the U. S. will require a steady increase in expenditures for research and development. The current level is about $4 billion a year, as much as we spent on research and development in the entire period 1776 through 1933. The economic effects of the $17 billion spent during the past five years will not be felt immediately but will have a continuing beneficial effect in coming years.

"It is not possible to carry on research and development without trained personnel. If research and development expenditures follow their present upward trend, we may need a net increase of 150,000 *research* scientists and engineers in the period 1954-1965. Figures of those in school and estimates of enrollments indicate that it is highly improbable that this goal can be attained."

Editorial in *Chemical and Engineering News*

Hoover Commission on Research

As a service to readers, we present verbatim the widely discussed and reported recommendations of the Hoover Commission on research and development in Government.

THE RECENTLY ISSUED HOOVER COMMISSION report on *Research and Development in the Government* has aroused wide interest. Designed, as it was, to improve the organization of Federal research and development activities from the lessons of experience, much of the report is concerned with the activities of the Department of Defense, which carries on the bulk of the research activities.

The Task Force Subcommittee assigned to study the activities of the defense agencies included, in addition to Battelle's Clyde Williams, Mervin J. Kelly, President, Bell Telephone Laboratories, Inc., who served as chairman; Frederick L. Hovde, President of Purdue University; Robert M. Kimball, Administrative Associate Director, Los Alamos Scientific Laboratory; and C. Guy Suits, Vice President and Director of Research of the General Electric Company.

The Hoover Commission's recommendations on the subject of research and development include the 15 recommendations of its Task Force Subcommittee and five additional recommendations of its own.

SUBCOMMITTEE RECOMMENDATIONS

1. That the Department of Defense review and assess the effectiveness of the recently established plan of combined operation of the Offices of the Assistant Secretary (Research and Development) and the Assistant Secretary (Applications Engineering) with a view to their integration into the Office of one Assistant Secretary.

2. That the authority of the Secretary of Defense to withhold appropriated funds from any research and development project be wisely and fearlessly used to promote integration of the programs of the three Departments, to prevent unwarranted duplication, and to promote effectiveness and efficiency in the use of research and development funds.

3. That the Office of the Assistant Secretary (Research and Development) give emphasis in its consideration of research and development programs in preventing unwarranted duplication, and that the Assistant Secretary (Research and Development) and Assistant Secretary (Applications Engineering), through standardization for production procedures, prevent unwarranted duplication in weapons.

4. That the Assistant Secretary of Defense (Research and Development) appoint a standing committee, reporting directly to him, of outstanding basic and applied scientists. This committee will canvass periodically the needs and opportunities presented by new scientific knowledge for radically new weapons systems. The Assistant Secretary of Defense (Research and Development) will appropriately implement this committee's recommendations where action is indicated.

5. That the Weapons Systems Evaluation Group be shifted to contract operation with university or nonprofit organizations. It then be expanded to a size adequate for performing the studies required by the Joint Chiefs of Staff and Assistant Secretary of Defense (Research and Development).

The Assistant Secretary of Defense (Research and Development) be responsible for the action essential to bringing Weapons Systems Evaluation Group to an adequate level of size and effectiveness.

6. That an administrative review and assessment of the operations and contributions of all committees and consultants be made by the Department of Defense and each of the Military Departments.

7. That an Office of Assistant Secretary for Research and Development be established in each of the three Military Departments. This Office be restricted in its functions to the research and development organization and operations of the Department.

That the Assistant Secretary be trained in science and technology and experienced in the operations and administration of research and development.

That this Office have a small staff trained in science and technology and experienced in the operation and administration of research and development.

8. That the level of basic research in the Department of Defense be significantly increased above its present $20,000,000 level of annual expenditure.

9. That where choice is possible, operations of research and development should be performed at that place in the Nation where they can be done most effectively and with the greatest efficiency.

10. That the Secretary of the Army and his Chief of Staff give strong support to the research and development staff reorganization of December 23, 1954. The staff be adequate in size and of highest possible professional competence in research and development. The staff be given positive and effective administrative support in its operations in meeting its responsibility for control, integration, and coordination of the Army's research and development programs.

11. That the Secretary of the Navy and responsible senior Navy officers give strong administrative support to the new functions of the Office of Naval Research in coordinating and integrating the development program of the Navy. A staff adequate in size and of highest research and development competence be provided, and the programmatic recommendations of the Office of Naval Research be implemented.

12. That each of the Military Departments make a realistic examination of their growing needs for technical officers. If need be, as the Task Force Subcommittee expects, expand their programs to provide generously for an expanding number of officers trained in research and development.

13. That the three Military Departments review policies and their implementation on career officers in research and development. Move toward limiting the areas of rotation of research and development officers to technical assignments, and increase the time period of assignment in a position.

14. That higher levels of compensation for civil service professional employees be established, more nearly competitive with industry, and the number of higher level civil service positions be materially increased.

15. That the Department of Defense make a close examination of the operations under "cognizance" and take appropriate action to insure the preservation of the present highly effective integration of the development program through the Military Liaison Committee and the Armed Forces Special Weapons Project organization.

Additional Commission Recommendations

1. We earnestly commend the administrative recommendations of the Task Force Subcommittee to the Department officials concerned.

2. (a) That military officers assigned to Research and Development should serve for longer periods in order that they may become professionally adept;

(b) That in order to make such longer service possible such officers should be given the same preferment and promotion as if they were rotated in short-term service.

3. That the Senior Civil Service as recommended in our report on Personnel and Civil Service is urgently required in Research and Development if competency in administration is to be provided.

4. That the Presidential appointments of Assistant Secretaries of Defense and those in the three services, who are concerned with Research and Development, in the future be made from men of professional training outstanding in the Research and Development field.

5. That greater Federal support be given to basic and medical research.

"There is no tribute great enough to express the Nation's obligations to its scientists, engineers, and military personnel, for their contributions to our constantly increasing productivity and the strengthening of our national defense. And there can be no relaxation in this effort."

The Hoover Commission

Notes from Battelle

IMPROVING HOT-ROLLED STEEL PLATES

THE QUALITY OF steel plate is greatly influenced by the treatment given it in the rolling mill. Since little of the plain-carbon steel manufactured today can be heat treated, because of lack of heat-treating facilities, it is imperative that the steel's mechanical properties be of the highest possible quality when it leaves the mill. Battelle metallurgists recently studied one variable in rolling-mill treatment that affects steel properties—the temperature of the plate during the last working pass in the rolling mill. R. H. Frazier, F. W. Boulger, and C. H. Lorig reported the results of the investigation to the annual convention of the Association of Iron and Steel Engineers in Chicago last month.

They found that lowering temperatures during the last working pass decreased the ferrite grain size, increased the yield strength, and lowered the notched-bar transition temperature of steel plate. On the average, a 100-degree (F) decrease in temperature lowered the transition temperature 6 F in the Charpy and 8 F in the Navy tear test. The investigation included temperatures to a minimum of 1650 F, which gave the optimum results. The influence of the finishing temperature was about the same for both semikilled and aluminum-killed steels.

IMPROVING AIRCRAFT WELDMENTS

GOOD WELDMENTS ARE particularly important in aircraft assemblies, and the development of higher strength steels has made necessary the improvement of the quality of weld metals to be used in joining such steels. Recognizing this situation, the Air Materiel Command asked Battelle to investigate the causes of weld-metal cracking in high-strength steels.

The study began with a literature survey and consultations with the industry. These pointed up the following observations about weld-metal cracking: (1) the major type of cracking is hot cracking at elevated temperatures; (2) most cracking is intergranular and appears to be associated with segregation of low-melting or brittle constituents, as well as with stresses imposed during cooling; and (3) hot cracking in ferritic weld deposits is promoted by such elements as sulfur, phosphorus, oxygen, nickel (plus sulfur), and carbon, but is reduced by manganese.

The problem of hot cracking was studied first with the aim of correlating changes in high-temperature (1800 F to 2700 F) tension properties with cracking properties and, in turn, to correlate these properties with composition. In the course of the investigation, a hot-tension testing apparatus was developed which was found very useful for determining the properties of alloys at high temperatures, including the effects of small additions of alloying elements on the mechanical properties. Attempts were made also to locate detrimental constituents in the weld deposits.

R. P. Sopher, A. J. Jacobs, and P. L. Rieppel, who directed the study, found that: (1) hot cracking occurs over a temperature range where the increase in hot strength and hot ductility is insufficient to resist fracture caused by shrinking stresses in the cooling metal; (2) resistance to cracking in SAE 43 xx-type steels was only slightly impaired by increasing carbon content from 0.020 to 0.59 per cent, but was seriously affected when sulfur and phosphorus contents were increased from 0.006 to 0.030 per cent; (3) boron additions to the steels studied appeared to have a detrimental effect on the cracking resistance of the deposited weld metals; and (4) a correlation was established between the hot ductility of weld metals and cracking results obtained from welds in the modified Lehigh restraint specimen.

STUDY OF FLUIDS IN DRILLING

SEVERAL INTERESTING and unusual techniques were employed by Battelle physicists in an investigation just completed for the American Association of Oil-well Drilling Contractors. The purpose of the study was to learn the effects of drilling fluids upon the rates at which bits might penetrate rock. The study covered the influence of physical and chemical effects of the fluids upon the chipping action of the bits as well as the effects of faster chip clearance upon the breakage of new rock.

Donald Gideon and Ralph Simon report that the technique used in the first experiments involved the dropping of a sharp chisel on pieces of limestone covered with various fluids to observe the effects of the latter upon the amount of rock broken. Little, if any, difference was found among the fluids tested, which included several clay muds, weighted mud, CMC (sodium carboxymethylcellulose) solution, petroleum jelly, and starch paste. However, the study did show that the presence of rock chips in the fluid as much as doubled the resistance of rock to drilling. This indicated the importance of clearing the chips away from the bit.

To study how the various mud properties affect the clearance time for chips, the investigation team developed a transparent model of a typical hole bottom. This included a model of a bit, with provisions for circulating fluid in the usual way. "Chips" in the model were represented by rectangular pieces of aluminum held in place by pins. When the study was in progress, the "chips" could be released, providing realistic action, which was recorded on movie film for evaluation.

With this model, it was possible to study chip clearance time for a wide range of flow rates from the bit and a broad variety of fluid properties in muds.

From the study, it was concluded that clearance times for chips may be reduced by:

1. Increasing the flow velocity and turbulence of the fluid, by proper design of bit hydraulics, at the points where chips are formed;
2. Reducing the kinematic viscosity or gel strength of the fluid, or both, to as low a value as is consistent with other requirements; and
3. Designing bits for proper air-flow rates where air is to be used for flushing.

OFHC CAST COPPER ANODES

ELECTROPLATERS CAN obtain smoother copper plates from high-efficiency baths when the copper is supplied from high-purity, high-density cast anodes rather than from ordinary cast, rolled, or electrolytic-copper anodes. This was the conclusion, reported by W. H. Safranek and C. L. Faust of Battelle, growing out of Institute experiments with this oxygen-free, high-conductivity cast form of copper anode known as OFHC.

In the Battelle study, conducted for The American Metal Company, Ltd., particular attention was given to producing smooth plate without the use of anode diaphragms. The plating was done with high-efficiency copper cyanide baths. Under many plating conditions, oxygen-free, high-conductivity anodes performed better than other types of anodes. For example, in both air and mechanically agitated solutions, the high-purity, high-density cast anodes gave smoother plates than other types of anodes. With little or no agitation, results were the same as those for other types of anodes.

In copper sulfate baths, the dense, oxide-free cast anodes were superior to other anodes with respect to anode efficiency and uniformity of dissolution.

INCLUSIONS IN URANIUM

ALTHOUGH THE METALLURGY of uranium has been under intensive study since the early 1940's, no systematic effort had been made to identify the nonmetallic inclusions in the metal. Recently, Battelle metallurgists R. F. Dickerson, A. F. Gerds, and D. A. Vaughan undertook a study to make such identification possible by metallographic techniques. In the course of research, inclusions observed in the microstructure were extracted mechanically and identified by X-ray diffraction. Metallographic methods were then developed for identifying various inclusions.

The metallurgists report that they were able to identify magnesium and calcium fluorides, uranium monocarbide, uranium hydride, uranium monoxide, uranium dioxide, and uranium mononitride.

•

A Compilation of Chemical Compositions and Rupture Strengths of Super-Strength Alloys has been published by, and is available from the American Society for Testing Materials. It includes the name, nominal chemical composition, characteristic rupture strengths for rupture in 100 and 1000 hours, and the name of the patentee, for approximately 100 domestic and 41 foreign alloys. Conventional ferritic, martensitic, and austenitic stainless steels are not listed. The compilation, ASTM Special Technical Publication No. 173, was issued under the auspices of Subcommittee XII of ASTM Committee A-10 on Iron-Chromium, Iron-Chromium-Nickel and Related Alloys. It was prepared by a task force composed of Ward F. Simmons of Battelle, chairman, V. N. Krivobok, N. L. Mochel, and Russell Franks.

•

R. S. Davidson, chief of Battelle's bioscience division, has been appointed to the Research Committee of the Council for Agricultural and Chemurgic Research.

Writings by Staff Members*

Reactors, Radioisotopes, and Rotogravure Research. James M. Dugan. *Gravure*, July, 1955, pp. 11-13.

Describes an application of tracer-chemistry methods in studying the mechanism of penetration of a gravure resist by an etching solution. Evidence is presented that demonstrates the ion exchange nature of the resist membrane.

Simplify Approach to Titanium Heat Treatment. P. D. Frost. *Iron Age*, June 30, 1955, pp. 65-68.

Describes the fundamentals of the heat treatment of commercial titanium alloys, and how they compare with other metal systems, particularly aluminum and steel. It discusses the effects of individual alloying elements, the nature of the transformations that occur, the temperatures of critical interest, and the room-temperature mechanical properties that result.

Nutrient Deficiencies in Roses. Frank A. Gilbert. Paper in *American Rose Annual, American Rose Society*, 1955, pp. 38-44.

Discusses the effects upon roses of deficiencies in the soil of various nutrient elements. The problem of nutrient excesses is also considered.

Metallic Materials Resistant to Molten Zinc. Webster Hodge, R. M. Evans, and A. F. Haskins. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, July, 1955, pp. 824-832.

Refractory boron compounds are shown to resist corrosion by molten zinc. Coatings were made from ferroboron and manganese boron by welding, hard facing, and pack diffusion. Sintered compacts of mixtures of iron and chromium borides resisted corrosion of zinc at 600 C and oxidation at higher temperatures.

High Temperature Oxidation of Two Zirconium-Tin Alloys. M. W. Mallett and W. M. Albrecht. *Electrochemical Society, Journal*, July, 1955, pp. 407-414.

Reaction of dry oxygen with a zirconium-1.5 weight per cent tin alloy and a zirconium-2.5 weight per cent tin alloy followed the cubic rate law and the parabolic rate law, respectively, in the range 550 C to 900 C at one atmosphere pressure. Oxidation films were found to be *n*-type semiconductors from which a mechanism for the oxidation of zirconium was proposed.

◇

**Members of the Battelle staff are authors of the recently published articles and books listed on this page. In most cases, reprints are available from the Battelle Publications Office, 505 King Avenue, Columbus 1, Ohio.*

Lined Steel Shipping Containers for Hard-to-Hold Products. L. J. Nowacki. *Industrial Packaging*, June, 1955, pp. 15-18.

Describes the recent advances made in the lining of steel shipping containers with organic coatings to hold hard-to-package products and what research is doing to develop better lined containers.

Vapor Plating. C. F. Powell, I. E. Campbell, and B. W. Gonser. Electrochemical Society Series. 158 pp., 1955. John Wiley & Sons.

Describes vapor deposition, with emphasis on the chemical, rather than the physical process involved. Presents a unified picture of the principles, techniques, and conditions required for the formation of coatings of metals, carbides, nitrides, borides, silicides, and oxides by vapor-deposition techniques. Also summarizes the properties of resulting coatings and materials and suggests new applications of the process.

Better Castings With Less Metal. A. J. Stone, H. B. Kinnear, and A. R. Fraser. *Foundry*, July, 1955, pp. 118-121.

The effects of new rapidly igniting exothermic compounds developed for use on open risers and hot tops of ingots are described. These compounds help to eliminate excessive piping and shrink cavities in particular ferrous and non-ferrous metals.

Wet Cyclones. O. F. Tangel and R. J. Brison. *Chemical Engineering*, June, 1955, pp. 234-238.

Discusses the liquid-solid cyclone from the standpoints of principles of operation, operating and design variables, and various applications in mineral and chemical processing. Uses of the cyclone in classification, thickening, and specific-gravity separation are described.

Merit Raises (Or Recognition) at Battelle. Clyde Williams. Paper from *Eighth Annual Conference on the Administration of Research, Proceedings*, pp. 25-28, 1954.

A discussion of the many factors taken into consideration and the manner in which an employee is considered for merit raises.

Radiation Counter for Beta Particles. D. T. Williams. *Electrical Engineering*, July, 1955, pp. 595-598.

Describes a radiation counter using a cadmium sulfate crystal mounted in a hypodermic needle. The counter is small enough to be used in the body of a living animal or person, and has many potential uses in radiation treatment of cancer, control of cancer surgery, or tracer experiments on living subjects.

ABSTRACT INDEX

AERONAUTICAL ENGINEERING 575a
AGRICULTURE 575a
BIOCHEMICAL AND BIOPHYSICAL RESEARCH 575a
CERAMICS AND CONCRETE 576a
CHEMICAL ENGINEERING 578a
CHEMISTRY—ANALYTICAL AND INORGANIC 579a
CHEMISTRY—ORGANIC 580a
CHEMISTRY—PHYSICAL 581a
COATINGS 582a
CORROSION 585a
ELECTRICAL ENGINEERING 587a
ELECTROCHEMISTRY AND ELECTROPROCESSES 587a
ELECTRONICS 589a
ENGINEERING ECONOMICS 590a
FLUID MECHANICS 591a
FOOD TECHNOLOGY 591a
FUELS AND COMBUSTION 591a
GEOLOGY AND MINERALOGY 592a
GEOPHYSICS 592a
GRAPHIC ARTS 592a
HEAT POWER 592a
INFORMATION—PREPARATION AND DISSEMINATION 593a
INSTRUMENTATION AND LABORATORY APPARATUS 593a
LUBRICATION AND FRICTION 595a
MECHANICAL ENGINEERING 596a
METALLURGY 597a
METALS—EXTRACTION AND REFINING 600a
METALS—FINISHING, POLISHING, AND CLEANING 602a
METALS—FOUNDRY PRACTICE 603a
METALS—HEAT TREATMENT 605a
METALS—MECHANICAL AND PHYSICAL PROPERTIES 606a
METALS—MECHANICAL WORKING 612a
METALS—METALLOGRAPHY, TRANSFORMATIONS, AND STRUCTURES 614a
METALS—POWDER 619a
MINING ENGINEERING 619a
NONDESTRUCTIVE TESTING 619a
NUCLEAR PHYSICS, NUCLEONICS, AND RADIATION 621a
OPERATIONS RESEARCH AND MANAGEMENT ENGINEERING 622a
ORE AND MATERIALS BENEFICIATION 624a
PHYSICS 624a
PLASTICS 627a
POLLUTION AND WASTES 628a
RUBBER AND ELASTOMERS 628a
SPACE HEATING AND CONDITIONING 628a
TEXTILES AND FIBERS 629a
WELDING AND JOINING 629a
WOOD AND FOREST PRODUCTS 631a

BATTELLE TECHNICAL REVIEW ABSTRACTS

Volume 4, Number 10 October 1955

*** Asterisks mark items that may be used in the Battelle Library only. None of the unbound materials listed below are available for interlibrary loan.**

AERONAUTICAL ENGINEERING

12424 Some Aspects of Modern Aircraft Materials. H. Sutton. *Royal Aeronautical Society, Journal*, v. 59, July 1955, p. 494-501.

Properties, applications, and fabrication of steels and light alloys. Tables, graphs. 14 ref.

12425 Flight Determination of the Drag and Pressure Recovery of an NACA 1-40-250 Nose Inlet at Mach Numbers From 0.9 to 1.8. R. I. Sears and C. F. Merlet. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3218, July 1955, 30 p. (TL570 Un3t)

Tests involves flying ducted bodies with various types of air inlets and measuring the total and internal drag, and the pressure recovery as functions of Mach no. and mass flow. Photographs, diagrams, graphs, tables. 4 ref.

Books and Miscellaneous Publications

12426 Development of the Guided Missle. Kenneth W. Gatland. 2nd Ed. 292 p. 1954. Philosophical Library, New York. (UG630 G22d2)

Factual information on the contemporary development of guided weapons and rockets for military and peaceful purposes. Outlines the potentialities of the rocket as a weapon of offense or defense, as an instrument of atmospheric and outer space, research, and eventually as a vehicle of interplanetary travel.

12427 Flight Handbook. Maurice A. Smith, editor. 5th Ed. 282 p. 1955. Philosophical Library, New York. (TL545 F64)

Aircraft structures, controls, propulsion systems, armament, instruments, and navigation.

AGRICULTURE

12428 Photosynthesis by Isolated Chloroplasts. III. Evidence for Complete Photosynthesis. M. B. Allen, Daniel I. Arnon, J. B. Capindale, F. R. Whatley, and Lois J. Durham. *American Chemical Society, Journal*, v. 77, Aug. 5, 1955, p. 4149-4155.

Includes graphs, radioautograms. 21 ref.

12429* Growth Factors of Plants. Facteurs de croissance des plantes. VIII. Some Aliphatic α-Dichloro-Phenoxy- Diacids. Sur quelques α-dichloro-phénoxy-diacides aliphatiques. (French.) Marc Julia. *Bulletin de la société chimique de France*, 1955, no. 6, June p. 856-857.

Includes table. 11 ref.

12430* Antibiotics in Animal Nutrition. E. L. R. Stokstad. *Food Technology*, v. 9, Aug. 1955, p. 405-408.

Use of antibiotics to increase growth in a number of species of animals is examined. Studies on the mechanism of their action are reviewed including the vitamin sparing action and the inhibition of harmful bacteria in the intestinal tract. Clinical effects of continuous administration of antibiotics are also summarized. Tables. 37 ref.

12431 Production and Use of Liquid Fertilizers. A. V. Slack. *Journal of Agricultural and Food Chemistry*, v. 3, July 1955, p. 568-574.

To realize fully the sales potentialities in the field, it is necessary to consider the development of ways to use more economical raw materials and further determination of solubility relationships in the systems involved. Map, tables, diagram, graph. 14 ref.

12432* Control of Bacterial Spot in Tomato Fields With Streptomycin-Terramycin Sprays. Robert A. Conover. *Plant Disease Reporter*, v. 39, Aug. 1955, p. 611-615.

Includes tables. 4 ref.

12433* Studies on the Mechanism of Action of Ionizing Radiations in Plant Seeds. Lars Ehrenberg. *Svensk Kemisk Tidskrift*, v. 67, no. 5, 1955, p. 207-224.

Variables affecting the biological reaction; chemico-biochemical investigations. Graphs, tables. 59 ref.

12434* Importance of Accelerating and Inhibiting Agents in the Life of Higher Plants. **Die Bedeutung von Wuchs- und Hemmstoffen im Leben der höheren Pflanze.** (German.) O. Fischnich. *Zeitschrift für Pflanzenernährung Düngung Bodenkunde*, v. 69, nos. 1-3, 1955, p. 205-215.

Natural and synthetic accelerating and inhibiting agents; influence of the growth by antibiotics and other agents. 30 ref.

Books and Miscellaneous Publications

12435 Handbook of Pest Control. Arnold Mallis. 2nd Ed. 1068 p. 1954. Mac Nair-Dorland Co., New York. (TP980 M29h2)

Behavior, life history, and control of rats, mice, ants, termites, roaches, flies, spiders, and other pests.

12436* Atlas of the World's Resources. William Van v. I. The Agricultural Resources of the World. 258 p. 1954. Prentice-Hall, New York. (G2 V35a)

Survey of acreage, potentialities, and production of grains, vegetables, fruit, cattle, poultry, and other crops.

See also:

12438 (photosynthesis)
12442 (radioisotopes in agriculture)
12523 (analysis of insecticides)
12758 (biogeochemical prospecting)

BIOCHEMICAL AND BIOPHYSICAL RESEARCH

12437* Pathways of Carbohydrate Metabolism in Microorganisms. I. C. Gunsalus, B. L. Horecker, and W. A. Wood. *Bacteriological Reviews*, v. 19, June 1955, p. 79-128.

Includes tables, diagrams. 431 ref.

12438 Physical Problems of Photosynthesis. James Franck. *Daedalus*, v. 86, May 1955, p. 17-42.

An understanding of this phenomena in the field of biology and how it is connected with the principles of physics and chemistry. Graphs.

Biochemical and Biophysical Research

12439 Utilization of Proteins. Clarence P. Berg. *Journal of Agricultural and Good Chemistry*, v. 3, July 1955, p. 575-581.

Understanding the biochemistry and metabolism of amino acids points the way to better human and animal nutrition. Diagrams, table.

12440* Metabolic Formation of Homoserine and α-Aminobutyric Acid From Methionine. Yoshihiko Matsuo and David M. Greenberg. *Journal of Biological Chemistry*, v. 215, Aug. 1955, p. 547-554.

Includes graphs, table. 12 ref.

12441 Synthesis and Metabolism of Carbonyl-C^{14} Pyruvic and Hydroxypruvic Acids in Algae. Gerhard Milhaud, Andrew A. Benson, and M. Calvin. *U. S. Atomic Energy Commission, UCRL-2933*, Mar. 1955, 13 p. (UF767 U3u)

Includes photographs. 11 ref.

Books and Miscellaneous Publications

12442 Radioisotopes in Biology and Agriculture. C. L. Comar. 481 p. 1955. McGraw-Hill, New York. (QH505 C73r)

Presents basic principles with examples in physiology, nutrition, entomology, soils, and fertilizers. Includes all of the various techniques and information required for the biological applications of radioisotopes.

12443 Colchicine—In Agriculture, Medicine, Biology, and Chemistry. O. J. Eigsti and Pierre Dustin, Jr. 470 p. 1955. Iowa State College Press, Ames. (QK898 Ei45c)

Monograph covers history of crude extracts from 1550 B.C. through modern period to its role as a mitotic poison in current research.

12444 The Luminescence of Biological Systems. Frank H. Johnson, editor. 452 p. 1955. American Association for the Advancement of Science, Washington, D. C. (QH641 J63L)

A summary of some important aspects of the present status of our knowledge of bioluminescence and the outlook for further advances. Various avenues of approach, from the purely physical to the purely biological, are dealt with comprehensively and in pertinent detail.

12445 Biochemistry of the Aminosugars. P. W. Kent and M. W. Whitehouse. 311 p. 1955. Academic Press, New York. (QD321 K41b)

Survey of the mucins and other aminosugar-containing substances, with consideration given to their metabolism and of the enzymes which act on them and their derivatives.

12446 Annual Review of Biochemistry. J. Murray Luck, editor. v. XXIV. 805 p. 1955. Annual Reviews, Stanford, Calif. (QP501 A78a)

Twenty-one papers covering the chemistry of carbohydrates, phosphatides, proteins, peptides, and amino acids; biological oxidation, carotenoids, nucleic acid, lipides, vitamins, nutrition, hormones, and antibiotics.

12447 Advances in Experimental Caries Research. Reidar F. Sognnaes, editor. 236 p. 1955. American Association for the Advancement of Science, Washington, D. C. (RK331 Ad95)

A monograph based on experimental production and prevention of tooth decay in laboratory animals covering the work of 20 investigators.

12448 The Structural Chemistry of Proteins. H. D. Springall. 376 p. 1954. Academic Press, New York. (QD431 Sp82s)

Presentation of a concise, detailed, and up-to-date account of all work that has been done on proteins, including their composition, chemical properties, physico-chemical properties, and mol. structure.

12449 Genetics and Metabolism. Robert P. Wagner and Herschel K. Mitchell. 444 p. 1955. John Wiley & Sons, New York. (QH431 W12g)

Cell structure and functions; mutations; gene interactions.

See also:

12625 (bacterial corrosion)

CERAMICS AND CONCRETE

12450 An Apparatus for the Determination of the Moduli of Rupture and Elasticity in Crossbending to 1500° C. Stanley D. Mark, Jr. *American Ceramic Society Bulletin*, v. 34, July 1955, p. 203-206.

Includes diagrams, tables, photographs, graphs. 12 ref.

12451 Barium Titanate and Other Ceramic Ferrolectrics. II. Properties of Barium Titanate. Malcolm McQuarrie. *American Ceramic Society Bulletin*, v. 34, July 1955, p. 225-230.

Crystal structure and crystallographic transformations of barium titanate are discussed. Known thermal, electrical, and electromechanical properties of both single crystals and ceramic specimens of the material are summarized. Graphs. 114 ref.

12452 Slip Casting Thorium Dioxide. P. D. S. St. Pierre. *American Ceramic Society Bulletin*, v. 34, July 1955, p. 231-232.

Preparation of thoria ware and the means for overcoming difficulties in fabrication. Graphs. 9 ref.

12453 The Orthosilicate-Iron Oxide Portion of the System CaO-"FeO"-SiO_2. W. C. Allen and R. B. Snow. *American Ceramic Society, Journal*, v. 38, Aug. 1955, p. 264-280.

The phase equilibrium diagram has been determined for the liquidus surface of the portion of the system between fayalite, dicalcium silicate, wüstite, and lime. Equilibria involving tricalcium silicate explain earlier observations on open-hearth slags and furnace-bottom refractories. Graphs, micrographs, diagrams, tables. 24 ref.

12454 Use of Galvanized Sheets in Concrete Reinforcement. Irwin A. Benjamin. *American Iron and Steel Institute, Preprint*, 1955, 20 p. (TS300 Am35y)

Investigation of the bond of galvanized sheets to portland cement concrete to establish practical uses that could be made of high tensile corrugated galvanized sheets in the construction industry. Graphs, tables, photographs. 5 ref.

12455* Research on the Make-Up and Stability of Some Cobalt Oxide-Base Solid Solutions. **Recherches sur la constitution et la stabilité de quelques solutions solides a base d'oxyde de cobalt.** (French.) Jacques Robin. *Annales de Chimie (Paris)*, v. 10, May-June 1955, p. 389-412 + 4 plates.

Stability and equilibrium diagrams of different systems of mixed oxides: Fe-Co, Co-Ni, Co-Mg, Co-Zn; properties of mixed oxides with spinel structure; constitution and stability of Co_3O_4.

Diffraction patterns, graphs, tables. 10 ref.

12456* Effect of the Slag Drying Temperature on the Properties of Blast-Furnace Cement. **Wpływ temperatury suszenia żużla na własności cementu hutniczego.** (Polish.) Zdzisław Kurdowski. *Cement, Wapno, Gips*, v. 10, nos. 8-9, Aug.-Sept. 1954, p. 201-207.

Includes tables, graphs. 10 ref.

12457* Additional Information on the Problem of Bricks for Gates in Steel Casting. **Compléments d'information sur le problème des briques de coulée d'acier.** (French.) L. Halm. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques*, v. 12, no. 7, 1955, p. 1403-1423.

Analysis of factors inducing the wear of the gate bricks, such as steel composition, pouring temperature, ladle capacity, and time of each pouring operation; characteristics of the gate bricks; optimum composition depending on the prevailing conditions. Tables, graphs, photographs, micrographs. 3 ref.

12458* Silico-Alumina Refractories for Open-Hearth Furnaces. Standardization of Dimensions. Physico-Chemical Characteristics. **Réfractaires silico-alumineux d'aciéries Martin. Normalisation des dimensions. Caractéristiques physico-chimiques.** (French.) M. Savarre. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques*, v. 12, no. 7, 1955, p. 1425-1432.

Review of different types of refractories; necessity of standardization of dimensions and composition of bricks for individual purposes (furnace, gate, and ladle); influence of types of refractories on the cost of steel production. Tables, diagram.

12459 Differential Thermal Analysis and Its Application to the Study of Building Materials. D. B. Honeyborne. *Chemistry & Industry*, 1955, no. 24, June 11, p. 662-669.

Uses and limitations in industrial ceramics. Diagrams, thermograms. 30 ref.

12460* Limits of the Formation of Glass. **Les limites de la formation du verre.** (French.) Aniuta Winter. *Comptes rendus*, v. 240, no. 19, May 9, 1955, p. 1878-1880.

Discusses role of electrons in establishing bonding in a vitreous system. Table. 5 ref.

12461* Absorption of Carbon Dioxide in Molten Glass. **Sur l'absorption du gaz carbonique dans le verre en fusion.** (French.) Jean Mahieux. *Comptes rendus*, v. 240, no. 26, June 27, 1955, p. 2521-2522.

Accomplished by an atmosphere maintained with a partial pressure of C^{14}-labeled CO_2. 1 ref.

12462 The Thermodynamic Stability of Refractory Borides. Leo Brewer and Haakon Haraldsen. *Electrochemical Society, Journal*, v. 102, July 1955, p. 399-406.

Reactions between nitrogen gas and metal borides and between graphite and metal borides have been studied to obtain qualitative information on the relative stabilities of the metal boride phases. Tables, diagrams. 19 ref.

12463 Phase Equilibrium Studies of Steel Plant Refractories Systems. V. E. F. Osborn. *Industrial Heating*, v. 22, July 1955, p. 1459 + 4 pages.

Discusses the effects of alumina and chromium oxide on refractories for steelmaking. Graphs, diagrams. 1 ref.

12464 Cermets—New High-Temperature Materials. Robert Steinitz. *Jet Propulsion*, v. 25, July 1955, p. 326-330.

Specific characteristics of cermets and the general requirements for high-temperature material are discussed. Diagrams, graphs, micrograph, photograph, table. 15 ref.

12465 Production of Zirconium Diboride From Zirconia and Boron Carbide. Charles T. Baroch and T. E. Evans. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Aug. 1955, p. 908-911.

Techniques of production; design of graphite resistance furnace. Diagrams, tables. 13 ref.

12466 A Study of Some Strontium Aluminates and Calcium-Strontium Aluminate Solid Solutions. Elmer T. Carlson. *Journal of Research, National Bureau of Standards*, v. 54, June 1955, p. 329-334.

Studies of crystal habit and chemical activity. Photographs, tables, graph. 11 ref.

12467* Elastoplastic Properties of Thixotropic Structures in Aqueous Solutions of Bentonite Clays. **Uprugo-viazkostnye svoistva tiksotropnykh struktur v vodnykh suspenziiakh bentonitovykh glin.** (Russian.) L. A. Abduragimova, P. A. Rebinder, and N. N. Serb-Serbina. *Kolloidnyi Zhurnal*, v. 17, no. 3, May-June 1955, p. 184-195.

Kinetics of swelling, thixotropic suspension hardening, and deformation and other physical properties. Graphs, tables. 18 ref.

12468 Refractory Compounds and Cermets of Beryllium. Wallace W. Beaver. Paper from THE METAL BERYLLIUM. p. 570-598. 1955. American Society of Metals, Cleveland. (TN799.B4 W58m)

Preparation, fabrication, and properties of oxides, carbides, and nitrides of Be. Methods of preparing cermets containing oxides, carbides, and nitrides; intermetallic compounds; and a comparison of the refractory compounds and cermets of Be. Tables, photograph, graph, micrographs. 52 ref.

12469 The Refractory Properties of Beryllium Oxide. J. F. White. Paper from THE METAL BERYLLIUM. p. 599-619, 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Chemical and physical properties and the manufacture and uses of beryllia refractories. Tables, graphs. 91 ref.

12470 Induction Furnace Linings. Herbert Capitaine. *Metal Industry*, v. 87, July 15, 1955, p. 45-46.

Preparation of refractories for light alloys used in furnaces having capacities of over two tons. Graph. 1 ref.

12471* Industrial Application of Diamonds. **Les applications industrielles du diamant.** (French.) F. Fromholt. *Métallurgie et la construction mécanique*, v. 87, no. 6, June 1955, p. 511 + 5 pages.

Comparative hardness of diamonds; crystal structure; utilization of rough and finished diamonds; method of finishing. Diagram, table. (To be continued.)

12472 Automation in Welding Rod Manufacture. E. C. Wright. *Metal Progress*, v. 68, July 1955, p. 116-118.

Automatic equipment speeds up production, and overhead construction of baking ovens saves floor space. Photographs.

12473* They're Making Molds Out of Glass Now. Richard M. Smith and Nicholas J. Grant. *Modern Castings and American Foundryman*, v. 28, Aug. 1955, p. 30-32.

Process uses ceramic slip of crushed, almost pure silica glass to make shell molds for exceptionally smooth castings. Diagram, photographs.

12474* Elastic Properties of Lead Zirconate. (English.) Masakazu Marutake and Takuro Ikeda. *Physical Society of Japan, Journal*, v. 10, no. 6, June 1955, p. 424-428.

A study of materials in the antiferroelectric range, that show elastic behaviors similar to barium titanate; interactions between strains, and anti-parallel oriented dipoles—micro-piezoelectric effects—are introduced to explain the anomalies. Diagrams, graphs. 12 ref.

12475* New Types of Basic Refractories. **Nowe gatunki zasadowych materiałów ogniotrwałych.** (Polish.) W. Szymborski. *Prace Instytutów Ministerstwa Hutnictwa*, v. 7, nos. 2-4, 1955, p. 85-90.

Scarcity of magnesite deposits in Poland has necessitated a production technology of stabilized dolomite clinker as a substitute. Development principles, properties, and advantages of the product are presented. Tables, diagrams, graph. 14 ref.

12476* Reaction of Crystallized Calcium Silicates and Aluminates in Contact With a Limited Quantity of Water, but Sufficient to Form a Paste. **Evolution de silicates et d'aluminates de calcium cristallisés au contact d'une quantité d'eau limitée mais suffisante pour former pâte.** (French.) Albert Nicol. *Revue des matériaux de construction, C*, 1955, no. 477, June, p. 153-164.

Samples are studied by thermogravimetric and X-ray spectrum analyses. The silicates show only hydrolysis; quantitatively, 1-mol. of tricalcium requires 4.5 mol. of water. With the aluminates, the conversion always involves an intermediate monocalcium stage. Tables, graphs, X-ray spectra.

12477* Influence of the Quality of Portland Cement Clinker on the Initial Strength of Blast-Furnace Cement. **Influence de la qualité du clinker à ciment Portland sur les résistances initiales du ciment de haut fourneau.** (French.) Léon Blondiau. *Revue des matériaux de construction, C*, 1955, no. 477, June, p. 165-171.

Portland cement clinker acts as a powerful catalyzer of hydration and hardening, but tests do not bear out that a special high-grade lime clinker could be employed, in lesser amounts to improve the strength of the cement. Tables, graphs.

12478* Ceramics—Tools of Tomorrow? Ralph S. Towne. *Screw Machine Engineering*, v. 16, Aug. 1955, p. 35-38.

Cutting speeds nine times faster than tool steels and three times faster than carbides have been used successfully in experimental turning of steel with ceramic tooling. Diagrams, table, photograph.

12479* Utilization of Sodium-Carboxy-Methyl Cellulose in Ceramic Masses. **Die Verwendung von Natrium-Carboxy-Methyl-Cellulose in keramischen Massen.** (German.) F. H. van Beek. *Sprechsaal*, v. 88, no. 13, July 5, 1955, p. 287-290.

Possibility of utilizing not only in glass but in the basic composition of pottery, soft and hard porcelain masses, and its influence on the properties of raw and baked material. Graphs, diagrams.

12480 Beyond the Metals. I-II. Van Caldwell. *Steel*, v. 137, Aug. 1, 1955, p. 72-74; Aug. 8, 1955, p. 73-76.

New super refractories and new uses for the older ones. Table, diagram, photographs.

Ceramics and Concrete

12481* Thermal Processes During the Accelerated Firing of Construction Brick. **Teplovye protsessy pri uskorennom obzhige stroitel'nogo kirpicha.** (Russian.) E. Kh. Odel'skii. *Steklo i Keramika*, v. 12, no. 6, June 1955, p. 23-25.

Includes equations, graphs, table.

12482* **Stacked Ceramic Tubes.** Harold E. Sorg. *Tele-Tech & Electronic Industries*, v. 14, sec. 1, Aug. 1955, p. 92-93, 191-193.

New developments in the application of ceramic-metal assemblies to transmitting and receiving tube construction. Adaptability to modular circuitry. Photographs.

12483 Study of Metal-Ceramic Interactions at Elevated Temperatures. F. H. Norton and W. D. Kingery. *U. S. Atomic Energy Commission, NYO*-4630, Apr. 1, 1955, 15 p. (UF767 U3ny)

Measurements of surface tension and contact angles of Ni-Cr and Ni-Ti alloys indicate that Cr and Ti are adsorbed at the interface much the same way as is Si from Fe-Si alloys. The adsorption of Ti is appreciable at concentrations of 0.1 wt. %, and alloys containing surface-active materials are shown to wet oxides. Diagrams, graphs.

12484* Composition and Properties of Beryllium Boride. **O sostave i svoistvakh boridov berilliia.** (Russian.) L. Ia. Markovskii, Iu. D. Kondrashev, and G. V. Kaputovskaia. *Zhurnal Obshchei Khimii*, v. 25, no. 6, June 1955, p. 1045-1051.

Chemical and phase composition data. Tables, X-rays. 9 ref.

12485* Effect of the Composition of the Vitreous Phase of Steatite on Some of Its Properties. **O vlianii sostava steklovidnoi fazy steatita na nekotorye ego svoistva.** (Russian.) V. G. Avetikov, P. P. Budnikov, and E. I. Zin'kov. *Zhurnal Prikladnoi Khimii*, v. 28, no. 7, July 1955, p. 673-680.

Determination of crystallographic and dielectric properties. Graphs, tables. 16 ref.

Books and Miscellaneous Publications

12486 The Colloid Chemistry of Silica and Silicates. Ralph K. Iler. 324 p. 1955. Cornell University Press, Ithaca, N. Y. (QD181.S6 IL3c)

Assembles and correlates information relating to the behavior in colloidal state so as to present a coherent picture of the solubility, formation, and behavior of colloidal particles and surface chemistry of the solid phase.

See also:

12430 (antibiotics in animal nutrition)
13483 (metal ceramic seals)

CHEMICAL ENGINEERING

12487 Performance of Packed Columns. I. Total, Static, and Operating Holdups. II. Wetted and Effective-Interfacial Areas, Gas- and Liquid-Phase Mass Transfer Rates. III. Holdup for Aqueous and Nonaqueous Systems. H. L. Shulman, C. F. Ullrich, N. Wells, A. Z. Proulx, and J. O. Zimmerman. *A.I.Ch.E. Journal*, v. 1, June 1955, p. 247-264.

Includes tables, graphs, diagrams. 44 ref.

12488 Solids Concentration. Nathaniel Arbiter. *Chemical Engineering*, v. 62, Aug. 1955, p. 163-177.

Properties of solids; review of separation processes; including, sorting, gravity, magnetic, electrostatic, and flotation. Photographs, tables, graphs, diagrams.

12489* Corrosion in the Brewery. II. The Brewhouse. D. H. Edmonds. *Corrosion Prevention and Control*, v. 2, July 1955, p. 33-36, 54.

Use of zinc-rich paint and plastic-based coatings on fermenting vessels and other equipment. Photographs. (To be continued.)

12490 Corrosion Monitoring for Chemical Plant. C. Edeleanu. *Corrosion Technology*, v. 2, July 1955, p. 204-208.

Use of a simple valve voltmeter and a multi-point recorder or indicator to get continuous potential measurements. Anodic protection of equipment containing sulfuric acid. Graphs, diagrams, tables. 4 ref.

12491 Cooling Towers for Steel Plants—Why, When, Where and How. Howard E. Degler. *Iron and Steel Engineer*, v. 32, July 1955, p. 105-112; disc., p. 112-113.

Re-use of circulating water by recurrent cooling in a cooling tower will minimize cleaning of tubes, require smaller cooling equipment, as well as conserve the water supply and furnish a ready means for properly treating the water. Tables, graphs, diagrams.

12492* Chlorination of Travancore Monazite. II. Separation of Thoria From Rare Earths With Urotropine. B. Sarma and J. Gupta. *Journal of Scientific & Industrial Research*, v. 14, sec. B, Feb. 1955, p. 82-84.

Description of a simple method for precipitating pure thorium hydroxide from the chloride solution by the use of mixture of urotropine and hydrochloric acid. Tables. 6 ref.

12493* Filtering Deposits With a Low Filtrability. **Ein Beitrag zur Filtration schwer filtrierbarer Niederschläge.** (German.) R. Pietsch. *Mikrochimica Acta*, 1955, no. 4, p. 859-863.

A method is described in which the liquid in the filtering vessel is stirred. This results in a marked increase of the rate of filtration when flocculent and slimy precipitates, such as hydroxide precipitates, are present. Table, photographs. 6 ref.

12494 Rinse Water Re-Use by Ion Exchange. Charles Bueltman and Albert B. Mindler. *Plating*, v. 42, Aug. 1955, p. 1012-1018.

A brief summary of the re-use of rinse waters after treatment. Discusses plating baths and rinses, metal recovery, and waste treatment. Diagrams, graph, photographs. 6 ref.

12495 Water Purification With Activated Carbons. W. A. Helbig. *Plating*, v. 42, Aug. 1955, p. 1044-1045.

Use of activated carbons for the removal of organic impurities from plating rinse waters and impurities from other liquid wastes.

12496* Universal Ammonia Cracking Installation. **Een universele ammoniak-kraker.** (Dutch.) C. H. Luiten. *Smit Mededelingen*, v. 10, no. 2, Apr.-June 1955, p. 60-63.

New high temperature catalytic device furnishes N mixtures with 0 to 75% H in one process. Tables, graph, diagram, photograph.

12497 Removal of Halogens, Carbon Dioxide, and Aerosols From Air in a Spray Tower. R. C. Liimatainen and W. J. Mecham. *U. S. Atomic Energy Commission, ANL*-5429, Feb. 1955, 37 p. (UF767 Un3.1an)

Halogen absorption efficiencies ranged from 60 to 100% in a multiple nozzle caustic spray tower with gas flow rates up to 6000 cu. ft. per min. using 6 wt. % KOH on the average. Tables, graphs, diagram. 5 ref.

12498 Bibliography of the Fischer-Tropsch Synthesis and Related Processes. II. Patents. H. C. Anderson, J. L. Wiley, and A. Newell. *U. S. Bureau of Mines Bulletin* 544, 1955, 965 p. (TN21 Un36)

Contains abstracts of the technical literature and patents dealing with the history, development, and commercial application of the Fischer-Tropsch synthesis and related processes for the hydrogenation of carbon monoxide and the production of synthetic fuels and chemicals.

12499* Lyophilization and Its Industrial Application. **La lyophilisation et ses applications industrielles.** (French.) J. M. Dunoyer. *Vide*, v. 10, no. 57, May-June 1955, p. 42-49.

Includes diagrams, photographs. 5 ref.

Books and Miscellaneous Publications

12500 Cellulose Nitrate. Frank Douglas Miles. 417 p. 1955. Interscience Publishers, New York. (QD341.N8 M59c)

The physical chemistry of nitrocellulose; its formation and use.

12501 Mass Transfer—Transport Properties. F. J. Van Antwerpen, editor. v. LI. Chemical Engineering Progress Symposium Series, No. 16. 120 p. 1955. American Institute of Chemical Engineers, New York. (QD508 Am35m)

A symposium of nine papers covering mass transfer at rotating cylinders, in a countercurrent fluidized system, in gas bubbles, of gas in a packed column, in side drops in a gas, fluid mechanics in transfer, thermal diffusion, gas viscosities at high pressures, and simultaneous heat and mass transfer.

12502 Water Treatment, Prevention of Scale in Sea Water Distillation. Report PB 111569. 104 p. 1953. Office of Technical Services, U. S. Department of Commerce, Washington, D. C. (VM505 Un3.2w)

Thermocompression stills, used with some stabalized sea waters, show promising performance in a citric acid cycle; sea water composition shows considerable variation.

CHEMISTRY—ANALYTICAL AND INORGANIC

12503 Mass Spectra of Cyclopentadienyl Metal Compounds. I. Bis-Cyclopentadienyl Compounds of V, Cr, Fe, Co, Ni, Re and Ru, and Manganese and Magnesium Cyclopentadienides. L. Friedman, A. P. Irsa, and G. Wilkinson. *American Chemical Society, Journal*, v. 77, July 20, 1955, p. 3689-3692.

Attempts to establish a correlation of spectra with mol. structure. Tables. 17 ref.

12504 Direct Spectrophotometric Determination of Uranium in Aqueous Solutions. R. G. Canning and P. Dixon. *Analytical Chemistry*, v. 27, June 1955, p. 877-880.

A two-component spectrophotometric method utilizing the reduction of U and V by ferrous sulfate in phosphoric acid solution. Tables, graphs. 1 ref.

12505 Emission Spectrochemical Analysis of Vanadium and Iron in Titanium Tetrachloride. Spark-in-Spray Excitation Method. H. V. Malmstadt and R. G. Scholz. *Analytical Chemistry*, v. 27, June 1955, p. 881-883.

Method studied over range of 0.003 to 0.2% V and 0.005 to 0.1% Fe. Diagram, graphs, tables. 10 ref.

12506 Identification of Frozen Liquid Samples With the X-Ray Diffractometer. H. N. Smith and H. H. Heady. *Analytical Chemistry*, v. 27, June 1955, p. 883-888.

Samples are frozen, ground, and identified by comparison. X-ray charts, diagrams, table. 14 ref.

12507 Polarography With Platinum Microelectrodes in Fused Salts. Edward D. Black and Thomas De Vries. *Analytical Chemistry*, v. 27, June 1955, p. 906-909.

Carried out in the eutectic LiCl-KCl mixture from 380 to 450 C. Tables, graphs. 7 ref.

12508 Determination of Uranium Concentrates. Use of Ethyl Acetate. R. J. Guest and J. B. Zimmerman. *Analytical Chemistry*, v. 27, June 1955, p. 931-936.

Separated from $Al(NO_3)_3$ salted contaminants by ethyl acetate. Water bourn U is determined by the $NaOH\text{-}H_2O_2$ method. Tables, graphs. 23 ref.

12509 Radioisotopic Study of Uranium Separations. Separations by Filter-Paper Partition Chromatograph With 2-Methyltetrahydrofuran. Helen P. Raaen and P. F. Thomason. *Analytical Chemistry*, v. 27, June 1955, p. 936-944.

As little as 0.02 γ of U^{233} was detected by autoradiography. Tables, diagram, chromatograms, autoradiograms. 19 ref.

12510 Determination of Organic Nitrogen by Kjeldahl Method Without Distillation. C. I. Adams and G. H. Spaulding. *Analytical Chemistry*, v. 27, June 1955, p. 1003-1004.

Depends on a fractional titration with 0.2*N* NaOH in presence of Se. Table. 5 ref.

12511 Continuous Determination of Oxygen in Gases. J. T. Corcoran. *Analytical Chemistry*, v. 27, June 1955, p. 1018-1019.

Includes diagram.

12512 Determination of Oxygen in Titanium and Titanium Alloys. Maurice Codell and George Norwitz. *Analytical Chemistry*, v. 27, July 1955, p. 1083-1090.

Includes table, diagram. 45 ref.

12513 Stability of Colorimetric Reagent for Chromium, *s*-Diphenylcarbazide, in Various Solvents. Paul F. Urone. *Analytical Chemistry*, v. 27, Aug. 1955, p. 1354-1355.

Deterioration and sensitivity of *s*-diphenylcarbazide were studied in a variety of solutions involving seven organic solvents. Graphs. 14 ref.

12514* On Segregation of Castings by Spectrographic Analysis. II. Kazuo Yasuda and Kiichiro Amano. *Castings Research Laboratory, Reports, Waseda University*, 1955, no. 6, p. 49-54.

Spark method of determining segregation of Mg, Si, and Mn in wedge shaped castings of spheroidal graphite cast iron. Diagrams, micrographs, graphs.

12515* Paper Chromatography of U. **Une chromatographie, sur papier, de l'uranium.** (French.) Colette Soye. *Comptes rendus*, v. 240, no. 19, May 9, 1955, p. 1894-1896.

2 ref.

12516* Spectrochemical Investigation of the Behavior of Mineral Oils. **Spektrochemische Untersuchung des Betriebsverhaltens von Mineralölen. I.** Emission-Spectroscopic Analysis of Inorganic Constituents of Motor Oils. **Emissionsspektroskipische Analyse anorganischer Bestandteile in Motorenölen.** (German.) Horst Luther and Gerhard Bergmann. *Erdöl und Kohle*, v. 8, no. 5, May 1955, p. 298-304.

Direct method of determining the metal content in unused and used motor oils. Diagrams, tables, graphs, photograph. 30 ref.

12517 The Rapid Determination of Cadmium in Plating Solutions. Frank J. Versagi. *Finish*, v. 12, Aug. 1955, p. 29, 51.

Equipment, procedures, and materials for polarographic method. Graph.

12518 Analytical Chemistry of Beryllium. Clement J. Rodden and Frank A. Vinci. Paper from THE METAL BERYLLIUM. p. 641-691. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Presents, in an orientative manner, some of the adopted methods currently used in the Be industry. Diagrams, graph, table, photograph. 67 ref.

12519 The Decomposition of Blast Furnace Raw Materials and Slags. Steelmaking Slags and Refractories for the Purpose of Chemical Analysis. E. W. Harpham. *Metallurgia*, v. 52, no. 309, July 1955, p. 45-53.

Methods for the decomposition of iron ores and related materials, slags, and refractories of widely varying composition are referred to, and many of them described in detail. 83 ref.

12520* Spectral Analysis. **Analiza spektralna.** (Polish.) W. Klimecki. *Prace Instytutów Ministerstwa Hutnictwa*, v. 7, nos. 2-4, 1955, p. 183-202 + 1 plate.

Steeloscopic, spectrographic, and direct spectrometric analytical procedures for major elements of steels, high alloy steels, cast iron, Silumins, and Li in carnallites. Graphs, photographs, tables. 27 ref.

12521* Polarographic Determination of Iron and Copper in Pure and the Purest Aluminum (99.9 to 99.99%). **Die polarographische Bestimmung von Eisen und Kupfer in Rein- bzw. Reinstaluminium 99,9—99,99%.** (German.) Reinhold Neumann. *Zeitschrift für anorganische und allgemeine Chemie*, v. 279, nos. 3-4, June 1955, p. 234-240.

Includes graph. 9 ref.

Books and Miscellaneous Publications

12522 New Methods in Analytical Chemistry. Ronald Belcher and Cecil L. Wilson. 287 p. 1955. Reinhold Publishing Corp., New York. (QD75 B41n)

Survey of precipitants, indicators, and other reagents and their uses.

Chemistry—Analytical and Inorganic

12523 Chemical Analysis. v. VI. Analysis of Insecticides and Acaricides. Francis A. Gunther and Roger C. Blinn. 696 p. 1955. Interscience Publishers, New York. (QD139.I5 G95a)

A treatise on sampling, isolation, and determination including residue methods.

12524 Polarographic Techniques. Louis Meites. 317 p. 1955. Interscience Publishers, New York. (QD115 M47p)

Provides necessary theoretical and detailed experimental material for a practical background in polarographic technique and interpretation.

See also:

12691 (spectrographic control)
12760 (analysis of minerals)
12782 (analysis of petroleum)
12897 (analysis of cast iron)
13389 (analysis of slags)

CHEMISTRY—ORGANIC

12525 Peptides Isolated From a Partial Hydrolysate of Steer Hide Collagen. II. Evidence for the Prolyl-Hydroxyproline Linkage in Collagen. Thomas D. Kroner, William Tabroff, and John J. McGarr. *American Chemical Society, Journal,* v. 77, June 20, 1955, p. 3356-3359.

Linkage between residues of proline and hydroxyproline is verified by the isolation of DNP derivatives. Tables, diagram. 30 ref.

12526 The Base Strengths and Ultraviolet Absorption Spectra of the 2- and 3-Monohalopyridines. Herbert C. Brown and Darl H. McDaniel. *American Chemical Society, Journal,* v. 77, July 20, 1955, p. 3752-3755.

Includes tables, graphs. 14 ref.

12527 The Bromination of Tropinone. Alex Nickon. *American Chemical Society, Journal,* v. 77, Aug. 5, 1955, p. 4094-4097.

Tropinone combines with Br to form an insoluble complex that changes to 2-bromotropinone hydrobromide on standing. 20 ref.

12528* Reactions of Organo-Magnesium Compounds on Nitrogeneous Substances Having a Lactone Function. **Réactions des organo-magnésiens sur des corps azotés à fonctino olide. I.** Narcotine and Hydrastine. **Narcotine et hydrastine. II.** Reaction of Phenyl-Magnesium Bromide on Pilocarpine. **Réaction du bromure de phényl-magnésium sur la pilocarpine. III.** Reactions of Phenyl-Magnesium Bromide on Azlactones. **Réactions du bromure de phényl-magnésium sur des azlactones.** (French.) Maurice-Marie Janot and Henri Pourrat. *Bulletin de la société chimique de France,* 1955, no. 6, June p. 823-829.

10 ref.

12529* Investigation of Diazomethanes. **Untersuchungen an Diazomethanen. IV.** Reaction of Diazomethane With Methyl-[C^{14}]-Lithium. **Umsetzung von Diazomethan mit Methyl-[^{14}C]-lithium. V.** Reaction Behavior of Diazomethyllithium. **Reaktives Verhalten von Diazomethyllithium.** (German.) Eugen Müller, Wolfgang Rundel, and Dieter Ludsteck. *Chemische Berichte,* v. 88, no. 7, 1955, p. 917-933.

Determination of the mechanism of the reaction by means of radioactive C^{14}; reaction of diazomethyllithium with carbonyl compounds and benzonitrile; physical and chemical constants. Table, infra-red spectra. 30 ref.

12530* Information on Prins' Reaction. **Zur Kenntnis der Prinsschen Reaktion. I.** Reaction of Butadiene With Formaldehyde. **Über die Umsetzung von Butadien mit Formaldehyd. II.** Reaction of Butylene With Formaldehyde. **Über die Umsetzung von Butylen mit Formaldehyd. III.** Reaction of Allylcarbinol With Aldehydes and Ketones. **Über die Reaktion von Allylcarbinol mit Aldehyden und Ketonen.** (German.) Ernst Hanschke. *Chemische Berichte,* v. 88, no. 7, 1955, p. 1043-1061.

Includes table. 24 ref.

12531 Dicyclopentadienyliron Dicarbonyl. B. F. Hallam and P. L. Pauson. *Chemistry & Industry,* 1955, no. 23, June 4, p. 653.

Synthesis and identification of the ferrocene-like compound. 4 ref.

12532* Properties of the C = C Double Bond. Reaction of Ethylene and Propylene With Mercuric Salts. **Contribución al conocimiento de las propiedades del doble enlace C = C. Reacción del etileno y del propileno con sales mercúricas.** (Spanish.) V. Gomez Aranda, O. Sanz Pastor, and J. L. Martinez Cordón. *Combustibles,* v. 15, nos. 78-79, Mar.-June 1955, p. 102-120.

Includes tables. 35 ref.

12533* Spectrographic Research in the Anthracene Group. **Recherches spectrographiques dans le groupe de l'anthracène. I.** Absorption of Acyl-2 Anthracenes and Their Nitrogen Derivatives. **Absorption des acyl-2 anthracènes et de leurs dérivés azotés.** (French.) Modeste Martynoff. *Comptes rendus,* v. 240, no. 25, June 20, 1955, p. 2425-2427.

Quantitative spectrographic analysis of some two-substituted derivatives of anthracene shows that the side carbon atoms behave as benzene carbons. Ultra-violet spectra.

12534* Preparation of Anthracene Hydrocarbons. **Préparation d'hydrocarbures anthracéniques.** (French.) Jean Colonge and Lucien Bonnard. *Comptes rendus,* v. 240, no. 26, June 27, 1955, p. 2540-2542.

Acyl-6-tetrahydro-2,3,4,5 diphenylmethanes are cyclodehydrated in alkyl-9-tetrahydroanthracenes; the latter are dehydrogenated in corresponding anthracene hydrocarbons. Tables. 5 ref.

12535* Electrochemical and Catalytic Properties of a Platinum-Palladium Alloy (1:10). **Elektrokhimicheskie i kataliticheskie svoistva platino-palladievogo splava (1:10).** (Russian.) D. V. Sokol'skii and S. R. Omarova. *Doklady Akademii Nauk SSSR,* v. 102, no. 5, June 11, 1955, p. 977-979.

Hydration of dimethyl acetylenyl carbinol on Pt-Pd alloy at different temperatures in an alcohol-alkaline medium. Amount of activated-adsorbed H on surface of alloy is compared with pure Pd. Graphs, table. 4 ref.

12536* Geometrical Isomers of Decalin-1,2-Dicarboxylic Acid and Their Conversions. **Geometricheskie izomery dekalin-1,2-dikarbonovoi kisloty i ikh prevrashcheniia.** (Russian.) I. N. Nazarov, V. F. Kucherov, and V. M. Andreev. *Doklady Akademii Nauk SSSR,* v. 102, no. 6, June 21, 1955, p. 1127-1130.

Preparation and properties. 11 ref.

12537* Reactions With N^{15}. **Reaktionen mit ^{15}N. XVII.** Formation of Phenyl Azide From Phenyl Diazonium Chloride and Phenylhydrazine Hydrochloride. **Die Bildung von Phenylazid aus Phenyldiazoniumchlorid und Phenylhyrazin-hydrochlorid.** (German.) Klaus Clusius and Hans Craubner. *Helvetica Chimica Acta,* v. 38, no. 4, 1955, p. 1060-1065.

Mechanism of the reaction is shown by synthesis of products. Tables. 9 ref.

12538 Organic Anti-Foaming Agents. Courtland L. Agre, Gustav Dinga, and Ronald Pflaum. *Journal of Organic Chemistry,* v. 20, June 1955, p. 695-699.

Only a very few of the diamides, urethans, and ureas prepared were effective. Table. 8 ref.

12539* Acetylene Research. **Untersuchungen über Acetylene. XII.** Bromination of Diphenyl Polyacetylene. **Die Bromierung von Diphenyl-polyacetylenen.** (German.) Hans Heinrich Schlubach and Ernst Wolfgang Trautschold. *Justus Liebigs, Annalen der Chemie,* v. 594, no. 1, 1955, p. 67-75.

Physical and chemical constants of resulting compounds. Tables, diagrams. 22 ref.

12540* Criteria of the Effectiveness of the Properties of Fat Lubricants. **Pokazatel' ekspluatatsionnykh svoistv zhirovykh smazok.** (Russian.) V. A. Kut'in. *Legkaia Promyshlennost',* v. 15, no. 7, July 1955, p. 31-33.

Testing of fats used to soften, preserve, and reduce water penetrability of leathers; effects of temperature changes. Graph. 2 ref.

12541* Model Investigation of the Stand Oil Process. The Rate of Diels-Alder Reaction of Elaeostearic Acid Dissolved in Methylstearate. **Modellversuche zum Standöl-prozess. Geschwindigkeit der Diels-Alder-Reaktion von in Methylstearat gelöster Elaeostearinsäure.** (German.) A. Maschka and G. Müller. *Monatshefte für Chemie*, v. 86, no. 3, 1955, p. 397-407.

Influence of boiling temperature on the possibility of eliminating side reactions, thus increasing the rate of reaction. Tables, graphs. 15 ref.

12542* Study of the Reaction of Silicomethyl Ether With Magnesium-Organic Compounds. **Synthesis of Alkylmethoxysilanes. Izuchenie reaktsii kremnemetilovogo efira s magniiorganicheskimi soedineniiam. Sintez alkilmetoksisilanov.** (Russian.) M. G. Voronkov and A. Ia. Iakubovskaia. *Zhurnal Obshchei Khimii*, v. 25, no. 6, June 1955, p. 1124-1127.

Includes table. 21 ref.

12543* Some Views on the Mechanism of the Oxidation of Paraffin Hydrocarbons. **O nekotorykh vzgliadakh na mekhanizm okisleniia parafinovykh uglevodorodov.** (Russian.) V. K. Tsyskovskii. *Zhurnal Prikladnoi Khimii*, v. 28, no. 7, July 1955, p. 772-775.

Critical analysis of current theories. 8 ref.

Books and Miscellaneous Publications

12544 The Chemistry of Petroleum Hydrocarbons. Benjamin T. Brooks, Stewart S. Kurtz, Jr., Cecil E. Boord, and Louis Schmerling, editors. v. II-III. 448 and 690 p. 1955. Reinhold Publishing Corp., New York. (QD305.H5 C42)

Continues with the basic chemistry, mainly with the individual phases being contributed by experts in these fields.

12545 Organic Syntheses. E. C. Horning, editor. Collective v. III. 890 p. 1955. John Wiley & Sons, New York. (QD262 Or14s2)

Preparation and properties of more than 300 organic compounds.

See also:

12443 (colchicine)
12565 (non-porous carbon adsorption of hydrocarbons)

CHEMISTRY—PHYSICAL

12546 Physico-Chemical Aspects of Chemically Active Ultrasonic Cavitation in Aqueous Solutions. Olle Lindström. *Acoustical Society of America, Journal*, v. 27, July 1955, p. 654-671.

Includes diagrams, graph. 97 ref.

12547 Chelation of Copper (II) With Polyacrylic and Polymethacrylic Acid. A. M. Kotliar and H. Morawetz. *American Chemical Society, Journal*, v. 77, July 20, 1955, p. 3692-3695.

Process is investigated by comparing titration data, absorption spectra, and dialysis equilibria. Tables, graphs. 11 ref.

12548 Adsorption of Carbon Monoxide and Hydrogen on Cobalt: Presorption Experiments. M. V. C. Sastri and T. S. Viswanathan. *American Chemical Society, Journal*, v. 77, Aug. 5, 1955, p. 3967-3971.

The effect of the prior adsorption of CO on the subsequent adsorption of H and *vice-versa* was studied on a Co Fischer-Tropsch catalyst at temperatures below that of detectable reaction on the catalyst surface. Graphs, tables. 19 ref.

12549 Operating Characteristics of Membranes. Donald H. Hagerbaumer and Karl Kammermeyer. *A.I.Ch.E. Journal*, v. 1, June 1955, p. 152-156.

Glass membranes are subjected to N, O, and CO_2 gases. Tables, graphs, diagram, photographs. 13 ref.

12550 Dehydration of Hydrazine by Azeotropic Distillation. R. Q. Wilson, W. H. Mink, H. P. Munger, and J. W. Clegg. *A.I.Ch.E. Journal*, v. 1, June 1955, p. 220-224.

Aqueous solutions of hydrazine can be economically dehyrated by azeotropic distillation in a multi-column distillation system with aniline as an entrainer. Although the ridge in the vapor-liquid surface of the ternary system necessitates some recycle of the hydrazine, under optimum operating conditions about 70% of the hydrazine charged to the system can be recovered in one pass through the columns as essentially anhydrous material. Graph, diagrams, phase diagrams. 7 ref.

12551 Measurement of the Heat Transfer to Evaporating Ammonia. Hermann Schwind. *Henry Brutcher Translation No.* 3419, 40 p. (From *Abhandlungen des Deutschen Kältetechnischen Vereins*, 1952, no. 6, 57 p.) Henry Brutcher, Altadena, Calif.

Measurement, from the external surface of an internally heated horizontal tube, determined at 16 stations equally spaced around the tube. As a result, the various component processes at the different stations can be followed, and the mean heat transfer coefficient for the tube arrived at by summation and averaging.

12552 Thermodynamic Analysis of Two-Component and Multicomponent Systems. I. Determination of Activities of Components in Homogeneous and Heterogeneous Systems From Calorimetric Measurements Alone. W. Oelsen, E. Schürmann, and G. Heynert. *Henry Brutcher Translation No.* 3521, 21 p. (Condensed from *Archiv für das Eisenhuttenwesen*, v. 26, no. 1, 1955, p. 19-25.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 6474, v. 4, May 1955.

12553* Reaction Mechanisms. **Reaktionsmechanismen. V.** The Prins Reaction. **Die Prins-Reaktion.** (German.) Volker Franzen and Helmut Krauch. *Chemiker-Zeitung*, v. 79, no. 10, May 20, 1955, p. 335-337.

Reactions of aldehydes with olefins catalyzed with acids and in the presence of Lewis acids. 15 ref.

12554* Use of Ion Exchangers in Industry. **Anwendung der Ionenaustauscher in der Technik.** (German.) H. Hoek and E. Sailer. *Chimia (Switzerland)*, v. 9, no. 6, June 1955, p. 125-134.

Various methods and practical uses of ion-exchange reactions. Diagrams, photographs, graph, tables. 74 ref.

12555* The Electromotive Force of Filtration. **Sur la force électromotrice de filtration.** (French.) Luc-Henry Collet. *Comptes rendus*, v. 240, no. 19, May 9, 1955, p. 1889-1891.

Role of surface phenomena in the appearance of an e.m.f. of filtration in certain systems. 2 ref.

12556* Valence Vibration $\gamma C{=}O$ of Ketones in the Liquid State. **La vibration de valence $\gamma C{=}O$ des cétones à l'état liquide.** (French.) Marie-Louise Josien, Jean Lascombe, Jean Lecomte, and Jean-Paul Mathieu. *Comptes rendus*, v. 240, no. 20, May 16, 1955, p. 1982-1983.

Results of spectroscopic study, by absorption and diffusion, of aliphatic ketones. Table. 4 ref.

12557 Kinetics of Nickel-Sulfur and Steel-Sulfur Reactions. Andrew Dravnieks. *Electrochemical Society, Journal*, v. 102, Aug. 1955, p. 435-439.

The reaction of Ni with molten S between 205 and 445 C follows the parabolic law. The activation energy (Arrhenius) below approximately 300 C is in excess of 50 kcal.; above this temperature, it is about 20 kcal. Graphs. 32 ref.

12558 Mechanisms of Hydrogen Producing Reactions on Palladium. James P. Hoare and Sigmund Schuldiner. *Electrochemical Society, Journal*, v. 102, Aug. 1955, p. 485-489.

Hydrogen overvoltage mechanisms Pd, in H_2SO_4 and $H_2SO_4 + Na_2SO_4$ solutions, postulated in three regions. Graphs. 12 ref.

12559* Trivalent-Iron Complexes With Three Unpaired Electrons. **Eisen(III)-Komplexe mit 3 ungepaarten Elektronen.** (German.) E. Bayer and K. H. Hauser. *Experientia*, v. 11, no. 7, July 1955, p. 254-255.

Magnetic measurement of Fe(III)-complexes of amino acids show that in these compounds there are three unpaired electrons for each iron atom. Table, graph. 10 ref.

12560 Coagulation and Flocculation. *Faraday Society, Discussions*, no. 18, 1954, 372 p. (TK1 F22d)

Chemistry—Physical

The fields of classical coagulation, coacervation, and related biological phenomena are represented by 33 papers and general discussions of truly international origin.

12561* Surface Active Agents. **Les agents tensia-actifs.** (French.) L. Kaertkemeyer. *Industrie Chimique Belge*, v. 20, no. 6, June 1955, p. 633-645.

Principles; types; application of wetting, foaming, dispersing, and detergent properties of surface active agents. Diagrams, graphs. 52 ref.

12562* Determination of the Energies of Dissociation of Metallic Oxides (SrO, CaO, and MgO) According to the Measurement of the Intensity of the Resonance Lines of Atoms of a Metal in Flame Spectra. **Opredelenie energii dissotsiatsii okislov metallov (SrO, CaO i MgO) po izmereniiu intensivnosti rezonansnykh linii atomov metalla v spektrakh plamen.** (Russian.) I. V. Veits, L. V. Gurvich, and V. V. Korobov. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia*, v. 19, no. 1, Jan.-Feb. 1955, p. 21-22.

Includes equations. 6 ref.

12563 Continuous Ion Exchange. R. McNeill, E. A. Swinton, and D. E. Weiss. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Aug. 1955, p. 912-921.

Theory and mechanism of action. Applications to recovery and concentration of valuable metals, regeneration of pickling and plating liquors, prevention of pollution by waste effluents, and purification of valuable metals, such as the rare earths, by chromatographic fractionation. Diagrams, graphs, tables. 21 ref.

12564 Oxygen Chemisorption on Carbon Adsorbents. William V. Loebenstein and Victor R. Deitz. *Journal of Physical Chemistry*, v. 59, June 1955, p. 481-487.

Bone chars, charcoal, and C black studied at 200 to 400 C. Tables, graphs. 4 ref.

12565 The Adsorption of Hydrocarbons From Methanol and Ethanol Solutions by Non-Porous Carbons. Robert S. Hansen and Robert D. Hansen. *Journal of Physical Chemistry*, v. 59, June 1955, p. 496-498.

Adsorption of C_8H_{18}, $C_{10}H_{22}$, and $C_{12}H_{26}$ on Graphon, Sheron-6, and DAG-1 at 25 C. Graphs. 9 ref.

12566 Temperature Variation Studies in the Chemisorption of Hydrogen on Cobalt Catalysts. M. V. C. Sastri and V. Srinivasan. *Journal of Physical Chemistry*, v. 59, June 1955, p. 503-511.

Includes tables, graphs. 17 ref.

12567 Viscosity and Density of the Nitric Acid-Nitrogen Dioxide-Water System. David M. Mason, Ira Petker, and Stephen P. Vango. *Journal of Physical Chemistry*, v. 59, June 1955, p. 511-516.

System measured at 0, 25, and 40 C in the range from 75 to 100 wt. % HNO_3, 0 to 20 wt. % NO_2, and 0 to 5 wt. % H_2O. Table, graphs. 23 ref.

12568 Metal-Polyelectrolyte Complexes. III. Entropy and Enthalpy of Complexation for Polyacrylic Acid-Copper Systems. Ernst M. Loebl, Lionel B. Luttinger, and Harry P. Gregor. *Journal of Physical Chemistry*, v. 59, June 1955, p. 559-560.

Changes between linear and cross-linked complexes are measured by temperature dependence. Table. 5 ref.

12569 The Structure of Silica-Alumina Cracking Catalysts. Joseph D. Danforth. *Journal of Physical Chemistry*, v. 59, June 1955, p. 564-566.

A study of the acidity developed in the condensation products of $Al(OH)_3$ and Si compounds containing one, two, and three available hydroxyl groups suggests a plausible structure for the catalyst. Graph, diagram. 5 ref.

12570 Adsorption Studies on Metals. IV. The Physical Adsorption of Argon on Oxide-Coated and Reduced Nickel. A. C. Zettlemoyer, Yung-Fang Yu, and J. J. Chessick. *Journal of Physical Chemistry*, v. 59, July 1955, p. 588-592.

Comparison of the conclusions from a free energy function with those of isosteric heats and entropies. Table, graphs. 10 ref.

12571* On the Amorphous State of the Binary System of Nickel-Sulfur. (English.) Masao Sawada, Kenjiro Tsutsumi, Toshio Shiraiwa, and Masayoshi Obashi. *Physical Society of Japan, Journal*, v. 10, no. 6, June 1955, p. 459-463.

Investigation and results of the measurements of the electrical resistances and crystal structures of this system. Table, diagrams, photographs, graphs. 5 ref.

12572 Flammability of Sodium Alloys at High Temperatures. G. P. Smith, M. E. Steidlitz, and L. L. Hall. *U. S. Atomic Energy Commission ORNL*-1799, July 8, 1955, 4 p. (UF767 U30)

Data on flammability in air jets of Na alloys at temperatures from 600 to 800 C. Examines Na alloys containing Hg or Bi which are non-flammable over certain ranges of composition and temperature. Graphs, diagram. 1 ref.

12573* An Apparatus for the Differential Thermal Analysis of Sulfides. **Eine Apparatur für die Differentialthermoanalyse von Sulfiden.** (German.) Joh. E. Hiller and K. Probsthain. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 8, no. 6, June 1955, p. 257-267.

Design and operation of an apparatus for the analysis of sulfides and other highly corroding substances. Diagrams, graphs, photographs, tables. 21 ref.

Books and Miscellaneous Publications

12574* Electrolytes. **Elektrolyte.** (German.) Hans Falkenhagen. 2nd Rev. Ed. 263 p. 1953. S. Hirzel Verlag, Leipzig. (QD553 F18e2)

Comprehensive, theoretical treatise on electrolytes, including the classical theories and the newer theories of M. Planck, G. N. Lewis, Debye-Milner, Debye-Hückel, Falkenhagen, and Onsager and Fuoss.

12575 Physicochemical Calculations. E. A. Guggenheim and J. E. Prue. Series in Physics. 491 p. 1955. Interscience Publishers, New York. (QD456 G93p)

Presents 171 representative problems in 24 physicochemical fields complete with references, explanation, calculation, and discussion.

12576 An Introduction to Paper Electrophoresis and Related Methods. Michael Lederer. 206 p. 1955. Elsevier Publishing Co., Houston. (QD563 L49i)

Presents a general survey of applications of electrophoresis in organic, inorganic, and biological chemistry.

12577 Phase Changes. **Changements de phases.** (French.) 486 p. 1952. Société de Chimie Physique, Paris. (QD501 So13c)

Reports delivered at the Second Annual Meeting of the French Society of Physical Chemistry held jointly with the Commission on Thermodynamics of the International Physics Union at Paris on June 2-7, 1952. Includes papers on critical phenomena, phase equilibrium in solutions of polymers and colloids, theory of cooperative phenomena in solids, polymorphism, kinetics and phase changes in solids, ferromagnetism and electron phenomena, melting, and transitions in amorphous substances.

See also:

12486 (colloid chemistry)
12500 (physical chemistry of nitrocellulose)

COATINGS

12578* Hard Anodizing. **Die Harteloxierung.** (German.) L. Bosdorf and A. Beyer. *Aluminium*, v. 31, nos. 7-8, July-Aug. 1955, p. 321-327.

Details of the eloxal anodizing process, by Alcoa, which permits new fields of application for Al. Table, graphs, diagrams, photographs, micrographs. 15 ref.

12579 Distribution of Crystals in Titania Enamels Fired Directly on Steel. E. D. Lynch and A. L. Friedberg. *American Ceramic Society, Journal*, v. 38, Aug. 1955, p. 257-263.

A technique for studying the relation of the crystalline nature of the enamel to the bond developed on fired enamel specimens. Tables, graphs, micrographs, photographs. 11 ref.

12580 Fundamentals of Paint, Varnish and Lacquer Technology. XVI. Emulsion and Water Thinnable Paints. Elias Singer. *American Paint Journal*, v. 39, July 4, 1955, p. 64 + 6 pages.

Starts with whitewash and describes early emulsion paints. (To be continued.)

12581* Chemical Cleaning and Painting of Railroad Bridges. Joseph Bigos. *American Railway Engineering Association, Bulletin*, v. 57, no. 523, June-July 1955, p. 1-14.

Suitability of painting chemically cleaned and pretreated surfaces, in comparison with surfaces cleaned by hand-chipping and wire-brushing methods, and to evaluate the performance of a number of paints and coatings. Tables, diagrams, photographs.

12582 Photochemical Degradation of Automobile Lacquers. Roger L. Saur. *ASTM Bulletin*, 1955, no. 207, July, p. 61-65.

Experiments show that ordinary weathering is due to light, O, and water. A proposed deterioration mechanism accounts for these, of which the absence of any one greatly inhibits degradation. Micrograph, diagram, graphs, photograph.

12583 Photooxidative Degradation of Alkyd Films. E. B. FitzGerald. *ASTM Bulletin*, 1955, no. 207, July, p. 65-76.

The physical effects of degradation in alkyd films were quantitavely related to the conditions and chemical mechanisms that produce them. Micrographs, graphs, tables. 12 ref.

12584 Hardfacing With the Oxy-Acetylene Flame. E. Ryalls. *British Welding Journal*, v. 2, July 1955, p. 298.

Details preparation and flame manipulation. Diagram.

12585 Corrosion Resistance of Sprayed Coatings of Austenitic Steel. O. van Rossum. *Henry Brutcher Translation No.* 3433, 6 p. (Abridged from *Metalloberfläche*, v. 5, no. 5, 1951, p. 113A-115A.) Henry Brutcher, Altadena, Calif.

Detached coatings, obtained from steel tubes, were analyzed, tested for hardness, examined under microscope, corrosion-tested, and tested for intergranular corrosion, to determine their stability. Micrographs.

12586 Electrospark Hard Facing for Improved Erosion Resistance of Parts of Heat and Water Power Plants. A. D. Moiseev. *Henry Brutcher Translation No.* 3506, 6 p. (Abridged from *Vestnik Mashinostroeniya*, v. 35, no. 2, 1955, p. 55-57.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 7782, v. 4, June 1955.

12587* Hot Dip Aluminium Coating for Cast Iron. Shigetomo Ueda. *Castings Research Laboratory, Reports, Waseda University*, 1955, no. 6, p. 38-41.

Application methods; coating properties. Diagram, tables, graphs, micrograph. 2 ref.

12588* Restoration of Grooves by Welding. **Rajeunissement des cannelures par soudage.** (French.) H. Charbonnier. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques*, v. 12, no. 5, 1955, p. 1021-1030.

Repair of rolling-mill rolls by submerged-arc deposition of wear-resistant metal. Diagrams.

12589 Corrosion Keys: Surface Coatings. Aluminum-Bronze Alloys. Karl Bennung, Bruce Fader, Frank McElroy, and I. S. Levinson. *Chemical Processing*, v. 18, July 1955, p. 74, 76, 78.

Neoprene, vinyl, epoxy, and Hypalon coatings compared; Al-bronze alloys are listed in 16 media. Graphs.

12590* Paint Faults and Remedies. XII. Peeling on Non-Ferrous Metals. H. Courtney Bryson. *Corrosion Prevention and Control*, v. 2, July 1955, p. 37-40.

Cleaning and pretreatment procedures which will prevent peeling; priming coats for wood. Tables. (To be continued.)

12591* The Athyweld Process. *Edgar Allen News*, v. 34, July 1955, p. 154-156.

Application of weld deposited coatings to salvage worn-out cutting tools. Photographs, diagram, table. (To be continued.)

12592 A Method for the Isolation of Surface Films From Aluminum Alloys and the Mechanism of the Reactions Involved. M. J. Pryor and D. S. Keir. *Electrochemical Society, Journal*, v. 102, July 1955, p. 370-381.

Use of warm solutions of I in methanol for isolating surface films not containing Cu. A mechanism for the dissolution of Al in iodine-methanol solutions is suggested. Tables, graphs, photographs. 29 ref.

12593 A Review of the Use of Molybdenum in Metal Spraying. Sheila M. Holgate. *Electroplating and Metal Finishing*, v. 8, July 1955, p. 258-262.

Properties and applications of sprayed Mo; spraying techniques; factors governing the adhesions of the coatings. 7 ref.

12594* Prevention of Paint Failures. II. Faults Due to Brush and Dip Application. III. Faults Due to Flow, Tumbling, Roller, Silk Screen Application, etc. *Industrial Finishing (London)*, v. 8, June 1955, p. 322-325; July 1955, p. 396-398.

Choice, preservation, and use of brushes; causes of wrinkling and alligatoring; effects of atmosphere, withdrawal rates, and ventilation; analyzes disadvantages of the application methods and details means by which troubles in their use may be averted. Photographs, diagrams.

12595* Electrochemical Principles of Metallic Coatings. II. Mechanism of Protective Action of Metallic Coatings. III. Corrosion at Pores and Discontinuity in Metallic Coatings. L. L. Shreir. *Industrial Finishing (London)*, v. 8, June 1955, p. 326 + 4 pages; July 1955, p. 389-392, 394, 400.

Polarization and its effect on protection; factors of corrosion potentials; anodic and cathodic coatings; evaluation of porosity tests. Graphs, table, diagrams, micrographs. 46 ref.

12596 Zinc Coatings on Steel. R. W. Bailey. *Industrial Finishing (London)*, v. 8, July 1955, p. 401 + 6 pages.

Describes the history and characteristics of varying types of Zn coatings and gives details of exposure test work on them. Micrographs, graphs, photographs, tables, diagrams. 8 ref.

12597 The Electron Microscope in the Study of Paints. N. D. P. Smith. *Institute of Metal Finishing, Transactions, Advance Copy No.* 12, v. 32, 1955, 10 p. + 6 plates. (TS670 E25j)

Theory of the electron microscope; special specimen techniques, including a method of mounting pigments and a surface replica technique. Micrographs. 7 ref.

12598 Coatings; Good Structural Design Aids Battle Against Corrosion. C. G. Munger. *Iron Age*, v. 176, July 14, 1955, p. 108-111.

Angles, corners, welds, rivets, and edges are major trouble spots in coating steel structures, and consequently, the coating material quality is not as important as is the design of the structure. Diagrams, photographs.

12599 New Clad Metals Made by Vacuum Brazing. Kenneth Rose. *Materials & Methods*, v. 42, July 1955, p. 100-102.

Metals and sizes, bonding method, and properties of composites in new cladding process. Photographs. 3 ref.

12600 Electroless Chromium. Harry J. West. *Metal Finishing*, v. 53, July 1955, p. 62-63.

Construction of plating tank; bath solution; cleaning of pieces before plating; advantages.

12601* Electroless Nickel Deposition. Fred Pearlstein. *Metal Finishing*, v. 53, Aug. 1955, p. 59-61.

Efforts to produce a thin film of Pd on non-conductors, rendering the surface active for the reduction of Ni from the electroless Nn bath. Photographs, tables.

Coatings

12602 Protection of Magnesium-Base Alloys. W. F. Higgins. *Metal Industry*, v. 87, July 29, 1955, p. 87-89, 93.

Special problems regarding the painting of Mg alloy castings and a composite scheme which embraces suitable foundation treatments with adequate painting measures. Table.

12603* Galvanization of Castings. **La galvanisation de la fonte de moulage.** (French.) *Métallurgie et la construction mécanique*, v. 87, no. 6, June 1955, p. 535, 537, 539-540.

Critical analysis of the methods used. Tables, micrographs.

12604 Recent Developments in Chromium Diffusion. I. Factors Controlling Processing Technique. R. L. Samuel, N. A. Lockington, and H. Dorner. *Metal Treatment and Drop Forging*, v. 22, June 1955, p. 233-236.

Describes how the conditions of processing have to be chosen according to the steel compositions and the type of coating desired, and how the problems of economically treating a great variety of articles, in large or small batches, were solved. Diagram, table. 3 ref.

12605* New Trends in Colored House Paints. W. G. Vannoy. *Official Digest. Federation of Paint and Varnish Production Clubs*, v. 27, July 1955, pt. 2, p. 1-18.

Formulation data on oil-, alkyd-, and polyvinyl acetate based colored paints. Tables, photographs. 2 ref.

12606* Evaporation of Thinners and Solvents. D. J. Rasmussen. *Official Digest. Federation of Paint and Varnish Production Clubs*, v. 27, Aug. 1955, p. 529-536.

Discussion on the volatilities or evaporation rates of thinners and solvents alone and from protective coatings. Photograph, graphs, table. 7 ref.

12607* Efficiency of Chromate Pigments as Anti-Corrosion Agents. George W. Grupp. *Organic Finishing*, v. 16, July 1955, p. 14-15.

Results of seawater spray corrosion tests made with 18 different chromate pigmen..s. Tables.

12608* On the Structure of Evaporated Thin Films of Metals. (English.) Shiro Ogawa, Denjiro Watanabe, and F. Eiichi Fujita. *Physical Society of Japan, Journal*, v. 10, no. 6, June 1955, p. 429-436.

Study of thickness, area, and repeat frequency of twinned layers by means of electron microscope. Micrographs, diagrams. 11 ref.

12609* Surface Treatment of Core Metal Used for Oxide-Coated Cathode. (English.) Junkichi Nakai and Shōgo Nakamura. *Physical Society of Japan, Journal*, v. 10, no. 7, July 1955, p. 566-570.

Results of experiments showing the effect of contaminated surface layers on the activity of drawn Ni sleeves that have suffered severe mechanical processing and heat treatment. Diagrams, graphs, tables. 1 ref.

12610* Give Your Pipe Coating a Chance. Warren D. Palmer. *Pipe Line News*, v. 27, May 1955, p. 45-46, 48, 2A.

Importance of independent supervision, inspection, and field control in the various processes of pipe line construction.

12611* Diffusion Coating of Steel and Chromite Treatment of Zn Alloys. **Dyfuzyjne powłoki ochronne na stali i chromianowanie stopów cynku.** (Polish.) E. Gąsior. *Prace Instytutów Ministerstwa Hutnictwa*, v. 7, nos. 2-4, 1955, p. 157-163.

Development, properties, and evaluation of Cr and Al coating methods as anti-corrosive measures; inspection and regeneration of chromizing baths and the effect of coatings on the anti-corrosive value of Zn alloys. Graphs, micrographs, diagram, table. 32 ref.

12612 Nickel Plating by Chemical Reduction. W. J. Crehan. *Product Engineering*, v. 26, July 1955, p. 148-152.

Results in greater corrosion protection and more uniformity in plate thickness over surface areas of intricate parts than can be accomplished with electroplating. Close-tolerance machined parts can be plated without requirement for post-machining or finishing, provided care is exercised in setting up the plating bath. Tables, graphs, photographs, diagrams. 4 ref.

12613 Metallized Plastic Films. Thomas Hammer. *Product Engineering*, v. 26, Aug. 1955, p. 182-185.

Types, properties, and uses for plain or laminated films, with coatings from 2-½ to 16 millionths thick are described. Table, diagram, photographs.

12614* Anodic Oxidation of By-Products Obtained From Oxidized and Sintered Aluminum. **Oxydation anodique des demi-produits obtenus à partir de poudres d'aluminium oxydées et frittées.** (French.) J. Hérenguel, P. Lelong, and M. Le Nouaille. *Revue de métallurgie*, v. 52, no. 5, May 1955, p. 369-374; disc., p. 374.

Discusses effect of current density on film color, influence of primary-oxide films in the metals, conditions of anodic oxidation and factors characterizing the sintered products. Graphs, photographs. 6 ref.

12615 Enameling of Zirconium. J. Schultz, H. P. Tripp, B. W. King, and W. H. Duckworth. *U. S. Atomic Energy Commission, BMI-994*, Apr. 27, 1955, 22 p. (UF767 U3b)

The major problems in enameling Zr with adherent, defect-free coatings resulted from: relatively low coefficient of thermal expansion of Zr, directional thermal-expansion properties of rolled Zr, undesirability of using enamel components of high thermal-neutron-absorption cross section, and desirability of fusing the enamel below 1475 F to avoid the α-β transformation of Zr when firing the coating. These problems were solved by suitable heat treatment of the Zr to reduce directional properties and the use of Pb-silicate type of enamel.

12616* On the Resistance to Weathering of Gray-Paints by Brushing and Spraying Processes. **Über die Witterungsbeständigkeit von Graufarben durch Pinsel- und Spritzauftragverfahren.** (German.) Karl Buser. *Werkstoffe und Korrosion*, v. 6, no. 6, June 1955, p. 281-282.

Effect of coating methods on the resistance to weathering of anti-rust paints. In weathering experiments, brushed coats proved to be generally better than sprayed ones.

12617* The Wash-Primer for Preconditioning Metals and Universal Prime-Coating. **Wash Primer als Metall-Vorbehandlung und universeller Haftgrund.** (German.) H. F. Sarx. *Werkstoffe und Korrosion*, v. 6, no. 7, July 1955, p. 331-334.

Composition, function, and directions for use of a two-component wash primer.

12618* Corrosion Resistant Coatings of Thin Sheet Metal on Steel and Concrete. **Korrosionsfeste Auskleidungen von Stahl und Beton mit Dünnblechen.** (German.) P. Voigt. *Werkstoffe und Korrosion*, v. 6, no. 7, July 1955, p. 337-343.

Cladding of equipment, vats, and tanks made of concrete, steel, or masonry by welding on "shingles" of stainless or other high-alloy steel. Diagrams, photographs.

12619 Hot Dip Galvanizing Is a Science. VI. Wallace G. Imhoff. *Wire and Wire Products*, v. 30, July 1955, p. 787 + 6 pages.

Relationship of thickness of coating to submersion time, metal thickness and bath temperature to coating thickness, and withdrawal time to wt. of metal deposited.

12620* The Nature of Coatings Formed During the Anode Oxidization of Magnesium and Its Alloys in Chromium Oxide Solutions. **O prirode plenok, poluchaemykh pri anodnom oksidirovanii magniia i ego splavov v khromovokislykh rastvorakh.** (Russian.) B. A. Pospelov. *Zhurnal Prikladnoi Khimii*, v. 28, no. 7, July 1955, p. 748-750.

Analysis of the water-soluble and acid-soluble portions of the black coatings; chemical composition of coatings. Tables. 2 ref.

See also:

12684 (metal finishing)
12685 (coating of Be)
12979 (painting metal surfaces)

CORROSION

12621* Influence of Heating on Mechanical Properties and Corrosion Resistance of P-AG5. **Influenza del riscaldamento sulle caratteristiche meccaniche e sulla resistenza alla corrosione della lega P-AG5.** (Italian.) D. Gualandi and G. Luft. *Alluminio*, v. 24, no. 3, May 1955, p. 229-240.

Heating of Al-Mg alloy resulted in decreased resistance to corrosion under stress. Graphs, micrographs, tables, diagram. 14 ref.

12622* Determination of Electrochemical Indexes of the Micro-Segregation in Metals. **Oznaczanie elektrochemicznych wskaźników stopnia mikrosegregacji w metalach.** (Polish.) Antoni Piotrowski. *Archiwum Górnictwa i Hutnictwa*, v. 2, no. 3, 1954, p. 373-415.

Investigation of the phenomenon of potential oscillation in "monometal" cells. Precise relation between the visible oscillations of the current seen in the curves and the micro-segragation is stated by the influence of homogenizing annealing of the test pieces. Graphs, diagrams, micrographs, tables. 27 ref.

12623 Resistance of Tubular Materials to Sulphide-Corrosion Cracking. J. P. Fraser and R. S. Treseder. *ASME, Transactions*, v. 77, Aug. 1955, p. 817-822; disc., p. 822-825.

Laboratory test procedure for rating alloys as to their resistance to sulphide-corrosion cracking. Tables, photographs. 7 ref.

12624 Acid Contamination as a Source of Error in Boiling Nitric Acid Test for Corrosion-Resistant Steels. Robert J. Bendure. *ASTM Bulletin*, 1955, no. 207, July, p. 76-77.

High and erratic penetration rates were obtained when the testing area inadvertently contained hydrofluoric acid fumes. Tables.

12625* Microbes as a Cause of the Destruction of Bitumen Insulation. **Mikroben als Ursache der Zerstörung einer Bitumenisolierung.** (German.) Th. Temme. *Bitumen, Teere, Asphalte, Peche*, v. 6, no. 5, May 1955, p. 161-164.

Microbic damage of corrosion-protective coatings and oxidation of hydrocarbons. Table, photographs.

12626* The Sulphurization-Resistant Property of Spheroidal Graphite Cast Iron at High Temperatures. Masakazu Shiozawa and Hiroshi Nakai. *Castings Research Laboratory, Reports, Waseda University*, 1955, no. 6, p. 12-14.

No significant difference exists between spheroidal graphite and ordinary cast iron; the shape of graphite exerts no serious affect, but alloy elements, which dissolve in matrices, seriously affect the resistant property. Tables, micrograph. 2 ref.

12627* Electrochemical Behavior of Ni. Voltage-pH Equilibrium Diagram of the Ni-H_2O System at 25 C. Corrosion of Ni; Ni Plating; Ni Storage Batteries. **Comportement électrochimique du nickel. Diagramme d'équilibre tension-pH du système Ni-H_2O, a 25° C. Corrosion du nickel; nickelage; accumulateurs au nickel.** (French.) E. Deltombe, N. de Zoubov, and M. Pourbaix. *Centre Belge d'Etude de la Corrosion, Rapport Technique*, no. 23, June 1955, 28 p. (TA462 C33r)

Study of electrochemical behavior of Ni by means of a voltage-pH equilibrium diagram. Conclusions are drawn relative to corrosion, general properties of Ni and its oxides, electrochemical and chemical deposition, and to the functioning of Ni alkaline storage batteries. Tables, diagrams. 61 ref.

12628* Cathodic Protection Installations at Kwinana. K. A. Spencer. *Corrosion Prevention and Control*, v. 2, July 1955, p. 23-27.

Protection of petroleum refining installations submerged in sea water. Photographs, diagrams.

12629 The Corrosion Section of the British Iron and Steel Research Association. K. H. Gibbons. *Corrosion Technology*, v. 2, July 1955, p. 209-212.

Description of laboratory facilities and work in progress on atmospheres, soil, and aqueous corrosion, and protective coatings. Diagram, photographs.

12630 Dissolution of Metals in Aqueous Acid Solutions. I. Current-Potential Relations for Iron and Mild Steel. A. C. Makrides, N. M. Komodromos, and Norman Hackerman. *Electrochemical Society, Journal*, v. 102, July 1955, p. 363-369.

Measurements of electrode potentials of Fe in hydrochloric acid alone and in hydrochloric acid solutions containing depolarizers are discussed on the basis of the theory of mixed-potential. Graphs. 18 ref.

12631 The Rate and Mechanism of Dissolutions of Purest Aluminum in Hydrofluoric Acid. M. E. Straumanis and Y. N. Wang. *Electrochemical Society, Journal*, v. 102, July 1955, p. 382-386.

Tests to determine rate of dissolution of pure Al in hydrofluoric acid. Effect of additions of ammonium fluoride and ammonium chloride on the dissolution rate. Table, graphs. 17 ref.

12632 High Temperature Oxidation of Two Zirconium-Tin Alloys. M. W. Mallett and W. M. Albrecht. *Electrochemical Society, Journal*, v. 102, July 1955, p. 407-414.

Rate of oxidation of a Zr-1.5 wt.% Sn alloy followed a cubic law in the temperature range 600-900 C at one atmosphere pressure, while the rate for a Zr-2.5 wt.% Sn alloy followed a parabolic law in the range 550 to 900 C. The effect of Sn in the Zr increases the porosity of films and decreases the time before breakdown of the protective properties of the films. Tables, graphs, micrographs, diagram. 9 ref.

12633 Mathematical Studies of Galvanic Corrosion. III. Semi-Infinite Coplanar Electrodes With Equal Constant Polarization Parameters. James T. Waber. *Electrochemical Society, Journal*, v. 102, July 1955, p. 420-429.

Mathematical analysis of a coplanar alternating array of long narrow electrodes was conducted subject to the limitation that polarization parameters for the anodes and cathodes are constant and equal. Diagrams, graphs, tables. 13 ref.

12634 The Oxidation of Iron-Nickel Alloys. R. T. Foley, J. U. Druck, and R. E. Fryxell. *Electrochemical Society, Journal*, v. 102, Aug. 1955, p. 440-445.

High temperature (600 to 900 C) oxidation of Fe-Ni 42% Ni alloy. Reaction products were examined by metallographic and electron diffraction techniques, as well as chemical analyses after stripping. Tables, graph, micrographs. 13 ref.

12635 High Temperature Corrosion Rates of Several Metals With Nitric Oxide. Milton Farber, Alfred J. Darnell, and Donald M. Ehrenberg. *Electrochemical Society, Journal*, v. 102, Aug. 1955, p. 446-453.

Corrosion rates were determined for Fe, Ta, W, Mo, Ni, Cu, Ag, and the alloys Inconel and stainless steel. Tables, diagrams, graphs. 13 ref.

12636 High Pressure Oxidation of Metals. Oxidation of Metals Under Conditions of a Linear Temperature Increase. John P. Baur, Donald W. Bridges, and W. Martin Fassell, Jr. *Electrochemical Society, Journal*, v. 102, Aug. 1955, p. 490-496.

Studies on Ta, Cb, Mo, Cu, Zr, Mg, Ti, and W to develop a method whereby oxidation can be surveyed quickly and the pressure sensitive region found. Graphs, tables. 23 ref.

12637* Application of Anticorrosive Protection to Condenser Tubes. **Application à la protection anticorrosive des tubes de condenseurs.** (French.) A. J. Maurin. *Industrie Chimique Belge*, v. 20, no. 5, May 1955, p. 485-498.

Based on experience from salvage of tubes from 25,000 kw. condensers fed with polluted sea-water. Tables, graphs, diagrams.

12638 The Corrosion Resistance of Low-Alloy Steels. J. C. Hudson and J. F. Stanners. *Iron and Steel Institute, Journal*, v. 180, July 1955, p. 271-284 + 2 plates.

A systematic investigation of the effects of small amounts of alloying elements on the corrosion resistance of mild steel. Tables, diagrams, graphs, photographs. 6 ref.

12639* Internal Stresses in Polyethylene Insulating Covers for Marine Cables. **Über innere Spannungen in Polyäthylen-Isolationshüllen von Seekabeln. II.** The Effect of Differential Cooling Temperature of Tube. **Zur Auswirkung unterschiedlicher Aderkühltemperatur.** (German.) W. Kortsch. *Kolloid-Zeitschrift*, v. 141, no. 3, May 1955, p. 160-165.

Effect of cooling temperatures on internal stresses and stress corrosion. Tables, graphs, diagrams. 13 ref.

Corrosion

12640* Corrosion in Nuclear Power Plants. *Mechanical Topics*, v. 16, no. 3, 1955, p. 2-4.

Requirements of materials to be used in nuclear power plants and the tests made to prove them satisfactory. Photographs, diagram, table.

12641 Corrosion of Beryllium in Air. James L. English. Paper from THE METAL BERYLLIUM. p. 530-532. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Resistance of Be to corrosion at room temperature when in various worked forms, such as extrusions and machined specimens.

12642 Corrosion of Beryllium in Water. James L. English. Paper from THE METAL BERYLLIUM. p. 533-548. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Aqueous corrosion of Be in high purity water systems at temperatures below 100 C. Effect of pH, temperature, dissolved gases, dissolved ions, and corrosion control methods are discussed. Tables, graph. 22 ref.

12643 Corrosion of Beryllium in Liquid Metals. R. F. Koenig. Paper from THE METAL BERYLLIUM. p. 549-554. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Results of corrosion tests of Be in liquid Bi, Bi-Pb eutectic alloy, Bi-Pb-Sn eutectic alloy, Ga, Pb, Li, Hg, and Na. Tables, graph. 10 ref.

12644 Human Body Fluids Affect Stainless Steel. Carl Andrew Zapffe. *Metal Progress*, v. 68, July 1955, p. 95-98.

It is shown that mechanochemical attack extends to the austenitic stainless steels, which have failed from stress not exceeding the residual effects of cold working, and from corrodents and other products of human physiological processes. Micrographs.

12645 Controlling Corrosion With Cathodic Protection. H. R. Ludeker. *Metal Progress*, v. 68, Aug. 1, 1955, p. 86-90.

Corrosion, which costs our country billions of dollars each year, can be controlled by interposing an electrical resistance in the corrosion circuit or by limiting the difference in potentials of the anodic and cathodic areas. Photographs, diagram.

12646 Cathodic Protection for Oil-Well Casing. J. P. Barrett and E. D. Gould. *Oil and Gas Journal*, v. 54, July 18, 1955, p. 90-91.

Types of attact, current requirements, results of cathodic protection, surface pipe effect, and cost. Graphs. 4 ref.

12647 Progress Report on Accelerated Corrosion Tests for the Performance of Plated Coatings. W. L. Pinner. *Plating*, v. 42, Aug. 1955, p. 1039-1043.

Report on work to furnish the metal finishing industry with a valid test which is reproducible and will predict service behavior of plated coatings. Photographs. 2 ref.

12648* The Oxidation of Metals. U. R. Evans. *Reviews of Pure and Applied Chemistry*, v. 5, Mar. 1955, p. 1-21.

Discusses the conditions determining oxidation, movement of vacancies, effect of minor constituents, cation or anion mobility, boundary reaction, tunnel effect mechanism, and equations representing the effect of cavities or obstructions and lateral growth. Graph. 64 ref.

12649* Oxidation and Recrystallization of Tin Under a Reduced Pressure. **Sur l'oxydation et la recristallisation de l'étain sous pression réduite.** (French.) Jean-Jacques Trillat. *Revue de métallurgie*, v. 52, no. 5, May 1955, p. 349-352.

Through the use of a furnace, at controlled temperature, it was possible to follow, continuously, the passage of Sn from the crystalline state to the liquid state, then its progressive transformation into the oxides—SnO and SnO_2. Diagram, photographs. 7 ref.

12650 Corrosion of Stainless and Aluminum in Contact With Titanium. (Digest of "Corrosion of Stainless Steel and Aluminum Alloys in Contact With Titanium", by C. Braithwaite; *Royal Aircraft Establishment Technical Note Met.* 192, Feb. 1954, 11 p.) *Metal Progress*, v. 68, Aug. 1, 1955, p. 182, 184.

Tests by intermittent exposure to sea-water spray for 1-yr.

12651* Corrosion and Corrosion Protection. **Korrosion und Korrosionsschutz.** (German.) H. Mohler. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 21, no. 6, June 1955, p. 204-206.

Statistical analysis of corrosion damage on different materials, and preventive methods. 6 ref.

12652 Anodizing as a Means of Evaluating the Corrosion Resistance of Zirconium and Zirconium Alloys. R. D. Misch. *U. S. Atomic Energy Commission, ANL*-5229, 1953, 87 p.

Emphasizes differences in anodic behavior correlated with corrosion resistance. Differences of Zr were noticeable in rise of voltage with time at low current densities, but indistinguishable in the relationship between interference colors and applied voltage. Diagrams, graphs, photographs, tables. 28 ref.

12653* Electrochemical Theory of Corrosion and Ways of Increasing the Corrosion Resistance of Alloys. **Elektrokhimicheskaia teorii korrozii i puti povysheniia korrozionnoi ustoichivosti metallicheskikh splavov.** (Russian.) N. D. Tomashov. *Uspekhi Khimii*, v. 24, no. 4, 1955, p. 453-470.

Effect of structural heterogeneity; circumstances under which passive state of metal appears; corrosion resistance increased by alloying with cathodic additions. Graphs, diagrams, tables. 41 ref.

12654* Acid-Resisting Steels in the Production of Wood-Vinegar. **Säurebeständige Stähle in der Holzessigfabrikation.** (German.) L. Wetternik and H. Zitter. *Werkstoffe und Korrosion*, v. 6, no. 6, June 1955, p. 282-287.

Best results were achieved by a steel alloyed with 27% Cr, 4.5% Ni and 1.5% Mo. Diagram, graphs, tables.

12655* Short-Time-Tests in a New Test-Chamber for Corrosion. **Kurzzeitprüfungen mit einer neuen Korrosionsprüfkammer.** (German.) W. Hess. *Werkstoffe und Korrosion*, v. 6, no. 7, July 1955, p. 325-328.

Describes apparatus which produces a fine, homogeneous fog; advantages and applications. Photographs, tables, diagram.

12656* On the Mechanism of the Corrosion of Iron in Soils. **Über den Mechanismus der Korrosion des Eisens im Erdreich.** (German.) T. Markovic, Z. Dugi, and B. Sribar. *Werkstoffe und Korrosion*, v. 6, no. 7, July 1955, p. 334-337.

The rate of corrosion of Fe depends on the pH-value of the soil if the corrosion of the Fe takes place under an excess of O. Laboratory experiments with soft steel specimens show that corrosion of Fe in unsaturated soils is a reaction of the first order, in water-saturated soils it follows the law of diffusion. Graphs, tables.

12657* Corrosion Inhibitors. **Inhibitoren der Korrosion.** (German.) Hellmuth Fischer. *Zeitschrift für Metallkunde*, v. 46, no. 5, May 1955, p. 350-357.

Classification and mechanics of inhibitors; factors which influence the effect of inhibitors. Graphs, tables, diagrams. 21 ref.

12658* The Problem of Stress Corrosion of Homogeneous Solid Solutions. **Zum Problem der Spannungskorrosion homogener Mischkristalle. III.** Dependence of Stress-Corrosion Sensitivity on Solid Cu-Au and Ag-Au Solutions on the Au Content and Relationship to the "Solid-Solution Effect". **Abhängigkeit der Spannungskorrosions-Empfindlichkeit von Kupfer-Gold- und Silber-Gold-Mischkristallen vom Goldgehalt und Zusammenhang mit dem "Mischkristall-Effekt".** (German.) Ludwig Graf and Jürgen Budke. *Zeitschrift für Metallkunde*, v. 46, no. 5, May 1955, p. 378-385.

Effect of aqua regia, potassium cyanide solution, reagents which do not attack Ag, and Hg on stress corrosion of above solid solutions and on the change of strength properties under the influence of a liquid metal and chemical reagents. Graphs, tables. 20 ref.

12659* Electrode Potentials of Ternary Alloys Containing Intermetallic Compounds. **Elektrodnye potentsialy splavov trekhkomponentnykh sistem s khimicheskim soedineniem.** (Russian.) V. A. Iurkov and M. A. Krishtal. *Zhurnal Fizicheskoi Khimii*, v. 29, no. 5, May 1955, p. 778-780.

Measurements of electrode potentials of alloys provide data for predicting corrosion behavior. Micrographs, graph. 6 ref.

See also:

12595 (corrosion potentials)

ELECTRICAL ENGINEERING

12660* The Problem of Multiple Conductors. **Das Bündelleiterproblem.** (German.) G. Dassetto. *Aluminium*, v. 31, nos. 7-8, July-Aug. 1955, p. 342-343.

An Italian developed spacer which consists of inter-twined galvanized steel wires. Photograph.

12661* Effects of Elastic Deformations on Superconductivity. **Effets des déformations élastiques sur la supraconductibilité. I.** Case of Tin. **Cas de l'étain.** (French.) Claude Grenier. *Comptes rendus*, v. 240, no. 24, June 13, 1955, p. 2302-2304.

The variation ΔH_c of the critical field, under the effect of elastic deformations, is studied as a function of temperature. Graphs. 7 ref.

12662* Drying Electrical Machines. **Die Trocknung elektrischer Maschinen.** (German.) Arnold Wichmann. *Elektrotechnische Zeitschrift*, v. 76, Ausgabe A, no. 10, May 1955, p. 340-347.

Effect of voltage, temperature, and moisture on insulation resistance and drying at increased temperature; method for computing resistance. Photograph, diagram, graphs, tables. 14 ref.

12663* Nature and Performance of Pyroelectric Conductors. **Heissleiter, Wesen und Wirkungsweise.** (German.) Gerhard Ruthemann. *Elektrotechnische Zeitschrift*, v. 7, Ausgabe B, no. 6, June 1955, p. 217-221.

Theory, practical application and performance of thermistors; electrical resistivity of metals and oxides. Photographs, tables, graphs, diagram. 7 ref.

12664 Some Problems of Large-Scale Measurement in the Heavy Electrical Industry. T. P. Jolly. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. II. p. 537-561; disc., p. 583-588, 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Description and use of shop length gages; telescopic point gages, and diameter-measuring instruments. Photographs, diagrams, graphs, tables.

12665 Switch to Aluminum Overcomes Design Problems. S. S. Stenersen. *Iron Age*, v. 176, Aug. 11, 1955, p. 98-99.

Use of Al end frames results in elimination of eddy currents, and lighter wt. Photograph, diagrams, table.

12666 Kilovar, Kilowatt and Voltage Control in the Steel Industry. L. C. Levoy. *Iron and Steel Engineer*, v. 32, July 1955, p. 81-87; disc., p. 87-89.

Fundamental considerations for those plants generating all of their own electrical power, those generating part of their electric power from the utility, and plants purchasing all of their electric power from the utility. Diagrams, photographs, graphs. 5 ref.

12667 Synchronous Condensers for Steel Mill Service. E. I. Pollard. *Iron and Steel Engineer*, v. 32, July 1955, p. 129-134; disc., p. 134-135.

Use of a synchronous condenser, either alone or in combination with a buffer reactor or a series capacitor or both, to provide an effective method of keeping voltage flicker due to reactive load swings of an arc furnace within acceptable limits. Diagrams, graphs, photographs. 7 ref.

12668 Analysis of Electrode Phenomena in the High-Current Arc. J. D. Cobine and E. E. Burger. *Journal of Applied Physics*, v. 26, July 1955, p. 895-900.

Evaluation of the relative importance of various physical processes occurring at the electrodes of high-current arcs by examining the probable results of each process acting alone. Tables, graphs. 22 ref.

12669 Pressure Dependence of the Resistivity of Silicon. William Paul and G. L. Pearson. *Physical Review*, v. 98, ser. 2, June 15, 1955, p. 1755-1756.

The variation of resistivity of high-purity single crystals was measured as a function of hydrostatic pressure in the intrinsic range. The results are interpreted to give a decrease in energy gap between conduction and valence bands with applied pressure. Graphs. 6 ref.

12670* **Mercury Arc Rectifiers for Frequency Changing on Induction Heating Equipment.** *Wild-Barfield Heat-Treatment Journal*, v. 5, June 1955, p. 2-6.

Operating cycle and advantages over oil or gas fired furnaces are cited. Graphs, diagram, photograph.

Books and Miscellaneous Publications

12671 Servomechanisms and Regulating System Design. Harold Chestnut and Robert W. Mayer. General Electric Series. v. 11, 384 p. 1955. John Wiley & Sons, New York. (TA165 C42s)

The book is devoted to both the analytical and practical aspects of servo-mechanism design. It states the problems met in the design of regulators and feed-back control systems and develops methods for their solution.

12672 Introduction to Theoretical Electrical Engineering. **Einführung in die theoretische Elektrotechnik.** (German.) Karl Küpfmüller. 5th Ed. 473 p. 1955. Springer-Verlag, Berlin. (QC518 K95e5)

Principles of semiconductors, transistors, magnetic amplifiers, power lines, networks, wave guides, and electromagnetic radiation.

See also:

13430 (review of electric illumination)

ELECTROCHEMISTRY AND ELECTROPROCESSES

12673 Formation of the Intermetallic Compound PtZn at Room Temperature. (English.) H. H. Uhlig, J. S. MacNairn, and D. A. Vaughn. *Acta Metallurgica*, v. 3, no. 3, May 1955, p. 302-304.

Made by electrodepositing Zn on Pt cathodes up to 100 C. Ease and rate of formation is anomalous for Pt. Table, micrographs. 8 ref.

12674 Brightening Agents for the Tin-II Sulfate-Sulfuric Acid Electrolyte. C. A. Discher and F. C. Mathers. *Electrochemical Society, Journal*, v. 102, July 1955, p. 387-389.

Concentration ranges of electrolyte and operating conditions, properties of the electrodeposit, and role played by each of the addition agents are discussed. 6 ref.

12675 Electrodeposition of Molybdenum Alloys From Aqueous Solutions. D. W. Ernst, R. F. Amlie, and M. L. Holt. *Electrochemical Society, Journal*, v. 102, Aug. 1955, p. 461-469.

Nickel-Mo, Co-Mo, and Fe-Mo alloys were electrodeposited from aqueous solutions containing sodium molybdate, the sulfate of the codeposited metal, sodium citrate, and ammonium hydroxide. Diagrams, tables, graphs, micrograph. 13 ref.

12676 Periodic Current Reversal in Plating Copper-Lead Alloys. Nelson W. Hovey, John L. Griffin, and Albertine Krohn. *Electrochemical Society, Journal*, v. 102, Aug. 1955, p. 470-473.

Apparatus, based on the commutator principle, was designed and constructed to convert d.c. to square-wave a.c., and was applied in electrodepositing Cu-Pb alloys from a cyanide-tartrate solution. Diagrams, photographs. 3 ref.

12677 The Influence of a Surface Active Agent on the Electropolishing of Copper. K. F. Lorking. *Electrochemical Society, Journal*, v. 102, Aug. 1955, p. 479-484.

Evidence indicates that the cationic surface active agent, cetyl trimethyl ammonium bromide, is adsorbed at both the anode surface and on the walls of O bubbles. These factors are shown to account for the improvement in the micropolishing characteristics of the bath and in the reduction in the size of the pits formed on the anode during slow O evolution. Diagrams, graphs, tables. 12 ref.

Electrochemistry and Electroprocesses

12678 Institute of Metal Finishing, Transactions. (Annual Volume), v. 31, 1954, 554 p. Institute of Metal Finishing, London. (TS670 E25j)

Thirty-two papers delivered at the Fourth International Conference on Electrodeposition and Metal Finishing, London, Apr. 21-24, 1954.

12679 A Study of Cracking in Chromium Deposits. H. Fry. *Institute of Metal Finishing, Transactions, Advance Copy No.* 2, v. 32, 1955, 21 p. + 2 plates. (TS670 E25j)

Observations are made of the thickness of deposits at which cracking first occurs, of the relation between cracks and striations parallel to the basis metal apparent in etched cross-sections of deposits, and of stress as a function of deposit thickness. Tables, graphs, micrographs. 14 ref.

12680 A New Method of Analysing the Stresses and Strains in Deposited Coatings. H. J. Pick. *Institute of Metal Finishing, Transactions, Advance Copy No.* 3, v. 32, 1955, 15 p. (TS670 E25j)

Derivation of formulas, based on changes in dimension, in terms of a parameter called the "linear free strain", defined as that strain which a deposited coating would undergo in a direction parallel to the base if it were deposited on an infinitely thin base of no mechanical strength. Diagrams, graphs, table. 4 ref.

12681 On the Electrodeposition of Tungsten-Cobalt Alloys From Aqueous Solutions. T. P. Hoar and I. A. Bucklow. *Institute of Metal Finishing, Transactions, Advance Copy No.* 5, v. 32, 1955, 20 p. (TS670 E25j)

Equipment, materials, and operating procedures. Tables, graphs. 24 ref.

12682 Electroforming in Electronic Engineering. P. M. Walker, N. E. Bentley, and L. E. Hall. *Institute of Metal Finishing, Transactions, Advance Copy No.* 11, v. 32, 1955, 15 p. + 4 plates. (TS670 E25j)

Choice and preparation of mandrels; Cu plating solutions; process control procedures; advantages. Photographs, diagram, graphs, tables. 2 ref.

12683 Plating Machine Design Leads to High Anodizing Rates. Paul Pearson. *Iron Age*, v. 175, June 30, 1955, p. 59-61.

With an anodizing setup, based on a return-type electroplating machine design, coating uniformity and quality are considerable superior, maintenance is negligible, and, being custom built, the system makes good use of floor space. Diagram, photographs.

12684 Metal Finishing: New Developments Shape Future Trends. J. J. Obrzut. *Iron Age*, v. 176, July 14, 1955, p. 106-107.

Recent developments in plating machinery, control instruments, and chemicals and processes for use in plating and finishing.

12685 Plating and Cladding of Beryllium. J. T. Stacy. Paper from THE METAL BERYLLIUM. p. 295-303. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Studies of cladding Be with thin protective layers of suitable corrosion-resistant metals by such methods as electroplating, roll cladding, deposition from a carbonyl, and dip coating. Metals used in plating, preparation of surfaces, plating procedures, properties of electroplates, and surface finishes are discussed. A summary of results obtained in roll cladding Be with Al, Ni, Armco Fe, Monel, Ti, Zr, Inconel, and Type 304 stainless steel are given. Diagram, tables, micrographs. 12 ref.

12686 Electrodeposition of Nickel From Fluoborate Solutions. C. B. F. Young and William Strobach. *Metal Finishing*, v. 53, July 1955, p. 44-50.

Investigates the effect of bath composition and concentration, temperature, current density, pH, agitation, and addition agents. Tests on ductility of deposits, their uniformity of thickness, and ability to be buffed and to accept a Cr plate. Graphs, table. (To be continued.)

12687 Bronze Plating: Why and How. Frederick A. Lowenheim. *Metal Finishing*, v. 53, July 1955, p. 51-52, 58.

Numerous applications and description of the process, outlining the principal features. Photograph. 7 ref.

12688 The Slot Cell. J. B. Mohler. *Metal Finishing*, v. 53, July 1955, p. 53-58.

Testing procedure; plating and bath standards; operating current density; plating control practice. Diagrams, graphs, table. 10 ref.

12689* Great Flexibility — a Feature of New Automatic Plater. Nathaniel Hall. *Metal Finishing*, v. 53, Aug. 1955, p. 45-48.

Description and operation of an automatic nickel and chromium plater for mass production. Photographs.

12690* Electrodeposition of Nickel From Fluoborate Solutions. C. B. F. Young and William Strobach. *Metal Finishing*, v. 53, Aug. 1955, p. 53-58.

Equipment; baths; additives. Graphs, photograph. (To be continued.)

12691* Using the Spectrograph to Control an Industrial Production of Electrolytic Zinc and By-Products. **L'impiego dello spettrografo nel controllo di una produzione industriale di zinco elettrolitico e sottoprodotti.** (Italian.) G. Scacciati and A. D'Este. *Metallurgia italiana*, v. 47, no. 6, June 1955, p. 259-265.

Advantages and limitations in applying the spectrograph to control Ag, Bi, In, Tl, Ge, Sn, Sb, Mo, As, and Ga in Zn and Cd production. Tables. 14 ref.

12692 Radar Parts Precious Metal Plated for Conductivity. Burt R. Servass. *Precision Metal Molding*, v. 13, Aug. 1955, p. 52-53, 80.

Job plating of small parts with Ag and Pd. Photographs.

12693* The Anodic Oxidation of the Cast Irons and a Measurement of the Rate of Anodic Oxidation by Photoelectric Reflectometry. **Contribution à l'étude de l'oxydation anodique des fontes et mesure de la vitesse d'oxydation anodique par réflectométrie photo-électrique.** (French.) André Roos. *Revue de métallurgie*, v. 52, no. 6, June 1955, p. 467-472.

A method of measurement by means of a photoelectric cell and a description of the proposed device. Diagrams, graphs, micrographs, photograph. 6 ref.

12694* Fifteen Years of Research on Electro-Chemistry of Metals. **Quindici anni di ricerche sull'elettrochimica dei metalli.** (Italian.) Roberto Piontelli. *Ricerca scientifica*, v. 25, no. 4, Apr. 1954, p. 750-775.

Review of Italian research at the Univ. of Milan. Photographs, diagrams. 120 ref.

12695* On the Activities of Coexisting Elements in Molten Iron. III. The Activity of Mn in Molten Fe-Mn Alloy. (English.) Koji Sanbongi and Masayasu Ohtani. *Science Reports of the Research Institutes, Tôhoku University*, ser. A, v. 7, no. 2, Apr. 1955, p. 204-209.

Construction of an electrode concentration cell and measurement of the e.m.f. over the whole range of the Fe-Mn system. Diagrams, graphs, tables. 15 ref.

12696* The Anodic Behaviour of Iron-Chromium Alloys in Sulphuric Acid Solution. II. Effect of Chlorine Ions in Electrolytes. (English.) Susumu Morioka and Kazutaka Sakiyama. *Technology Reports, Tôhoku University*, v. 19, no. 2, 1955, p. 224-238.

A study of the degree of anodic polarization, critical current density for passivity, strong oxidizing action of Cl atoms discharged and adsorbed on the anode, and reducing action of Cl ions. Diagrams, graphs. 2 ref.

12697* The Isotopic Effect in the Electrolytic Migration of Potassium Ions in Molten Potassium Nitrate. **Der Isotopieeffekt bei der elektrolytischen Wanderung der Kalium-Ionen in geschmolzenem Kaliumnitrat.** (German.) Arnold Lundén, Carl Reuterswärd and Nils Sjöberg. *Zeitschrift für Naturforschung*, v. 10a, no. 4, Apr. 1955, p. 279-281.

Concentration of K^{41} isotopes at the anode; determination of relative difference of electrolytic migration velocities and of mass effect. Diagram, table. 11 ref.

12698* Concentration of Chlorine Isotopes by Electrolytic Transfer in Molten Lead Chloride. **Isotopenanreicherung beim Chlor durch elektrolytische Überführung in geschmolzenem Bleichlorid.** (German.) A. Klemm and A. Lundén. *Zeitschrift für Naturforschung*, v. 10a, no. 4, Apr. 1955, p. 282-284.

Experiments on the concentration of Cl^{38} at the anode of an electrolytic cell. Diagram, table. 3 ref.

12699* Investigation of the Effect of the Periodic Variation of Current Direction in the Electrolytic Deposition of Copper From Sulfate Baths. **Issledovanie vliianiia periodicheskogo izmeneniia napravleniia toka pri elektroosazhdeni medi iz sul'fatnykh vann.** (Russian.) Iu. Ia. Vene and S. A. Nikolaeva. *Zhurnal Fizicheskoi Khimii*, v. 29, no. 5, May 1955, p. 811-817 + 3 plates.

Variations in coarseness of crystalline structure of deposits under varying electrolytic conditions. Graphs, micrographs, tables, diagram. 10 ref.

12700* Determination of the Number of Electrons Taking Part in the Electrochemical Reduction of Nb and Ti. **Opredelenie chisla elektronov, uchastvuiushchikh pri elektrokhimicheskom vosstanovlenii niobiia i titana.** (Russian.) E. I. Krylov and V. S. Kolevatova. *Zhurnal Fizicheskoi Khimii*, v. 29, no. 5, May 1955, p. 818-821.

Coulometric and polarographic determination; stages of reduction. Tables, graphs. 6 ref.

12701* Problem of the Throwing Power of Electrolytes. **K voprosu o rasseivaiushchei sposobnosti elektrolitov.** (Russian.) L. I. Kadaner. *Zhurnal Fizicheskoi Khimii*, v. 29, no. 5, May 1955, p. 832-838.

Factors affecting distribution of current and metal on electrode surfaces; critique of previous methods of measuring dispersibility of electrolytes. Circuit diagram. 16 ref.

12702* Cathode Polarization During the Deposition of Mo Alloys With Metals of the Fe Group, From Aqueous Citrate and Ammonium Electrolytes. **Katodnaia poliarizatsiia pri osazhdenii splavov molibdena s metallami gruppy zheleza iz vodnykh tsitratno-ammiachnykh elektrolitov.** (Russian.) T. F. Frantsevich-Zabludovskayaia. *Zhurnal Prikladnoi Khimii*, v. 28, no. 7, July 1955, p. 700-710.

Polarization curves, and the variation of Mo concentration in solution. Graphs, tables. 15 ref.

See also:

12494 (purification of electroplating rinse water)
12652 (anodizing zirconium)
12929 (electrolytic extraction of boron)
13146 (fatigue in chromium plate)
13459 (electroplating waste recovery)
13460 (treatment of finishing wastes)
13461 (treatment of finishing wastes)

ELECTRONICS

12703* Experimental Investigation and Differentiation of the Causes of Noise in Plate-Shaped Transistors. **Experimentelle Untersuchung und Trennung der Rauschursachen in Flächentransistoren.** (German.) Walter Guggenbühl and Max J. O. Strutt. *Archiv der elektrischen Übertragung*, v. 9, no. 6, June 1955, p. 259-269.

Using a newer equivalent circuit, four sources are discussed as the causes of transistor-noise; namely, emission diode, base resistance, collector saturation, and current division noise. Graphs, diagrams. 11 ref.

12704* Problem of Ionic and Homopolar Bond in Semiconductors. **K voprosu ob ionnoi i gomeopoliarnoi sviazi v poluprovodnikakh.** (Russian.) I. M. Tsidil'kovskii. *Doklady Akademii Nauk SSSR*, v. 102, no. 4, June 1, 1955, p. 737-740.

Investigation of thermoelectric and electromagnetic phenomena in PbS, PbSe, PbTe, and Cu_2O to determine the type of prevalent bond. Graph. 23 ref.

12705 Designing Ultrasonic Alarm Systems. Samuel S. Bagno. *Electronics*, v. 28, Aug. 1955, p. 106-111.

Doppler effect detection system uses filtering and design techniques to eliminate false triggering of alarm by temperature changes and eddy currents in air while retaining sufficient sensitivity to detect fire and broken water pipes as well as burglars. Photographs, diagrams, graph. 1 ref.

12706 Squirrel-Cage Motor Speed Control System. Millard C. Spencer. *Electronics*, v. 28, Aug. 1955, p. 126-129.

Saturable-core reactors in motor leads of induction motor having high-resistance squirrel-cage rotors are connected to two-tube electronic control circuit to gain good speed regulation at any speed setting. Photograph, graphs, diagrams.

12707 Dielectric Lens for Microwaves. K. S. Kelleher and C. Goatley. *Electronics*, v. 28, Aug. 1955, p. 142-145.

Use of laminated disks to control index of refraction across face of dielectric lens. Construction is simple and beam-width characteristics are superior to those of conventional radiators. Photographs, diagrams, graphs.

12708* Design of a Comprehensive Computer for Handling Complex Creep Problems. I-II. A. J. Kennedy. *Engineer*, v. 200, July 1, 1955, p. 2-4; July 8, 1955, p. 34-35.

Consideration of the creep factor under conditions where stress and temperature are not kept constant; examination of the possibility of computing the behavior fairly rapidly, from the minimum experimental data. Diagram, graphs, photograph. 16 ref.

12709 Some Applications of Electronics to Industrial Dimensional Metrology. M. J. A. Chalvet. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. I. p. 193-202; disc., p. 203-204. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Principles and operation of comparators. Diagrams.

12710 Frequency Response of Theoretical Models of Junction Transistors. R. L. Pritchard. *Institute of Radio Engineers, Transactions on Circuit Theory*, v. CT-2, June 1955, p. 183-191. (TK1 In6.6c)

Comparison of the H.F. circuit performance of grown and fused junction transistor models for both grounded base and grounded-emitter operation. Tables, diagrams, graphs. 26 ref.

12711 Industrial Uses of Special-Purpose Computers. A. H. Kuhnel. *Instruments and Automation*, v. 28, July 1955, p. 1108-1113.

Examples are given for control of a punch machine requiring computed numbers of various-gage pieces, control of a milling machine for contour milling of turbine blades, and a special-purpose data-processor; analysis and design of the computer approach. Photographs, diagrams.

12712 The Adsorption of Gases on a Germanium Surface. J. T. Law. *Journal of Physical Chemistry*, v. 59, June 1955, p. 543-549.

Low pressure adsorption of CO, CO_2, N, and H measured between 100 and 300 C; surface cleaning methods studied. Table, graphs. 21 ref.

12713* The Counting of Photons by Electron Multiplier. **Fotonok számlálása elektronsokszorozóval.** (Hungarian.) András Ádám and Péter Varga. *Magyar Fizikai Folyóirat*, v. 3, no. 3, 1955, p. 249-256.

Investigations with an RCA931-A photomultiplier to establish the technical basis for micro-optical measurements. Circuit diagrams. 11 ref.

12714* Aluminum in Electronic Equipment. E. A. Farrell. *Modern Metals*, v. 11, July 1955, p. 35 + 6 pages.

Applications in electrical and electronic components and structures. Photographs.

12715 Optical and Impact Recombination in Impurity Photoconductivity in Germanium and Silicon. N. Sclar and E. Burstein. *Physical Review*, v. 98, ser. 2, June 15, 1955, p. 1757-1760.

The impact (three-body) recombination and optical recombination coefficients are calculated for H-like impurity centers in extrinsic Ge and Si in thermal equilibrium. Tables. 12 ref.

Electronics

12716 Water-Vapor-Induced *n*-Type Surface Conductivity on *p*-Type Germanium. R. H. Kingston. *Physical Review*, v. 98, ser. 2, June 15, 1955, p. 1766-1774.

By utilizing a direct reading instrument it is possible to measure the *n*-type surface conductance of the *p*-type Ge in an *n-p-n* junction transistor as a function of relative humidity, ambient gas, and surface treatment. Diagrams, tables, graphs. 19 ref.

12717 Progress in the Design and Use of Closed-Circuit Television in Industry. L. Walter. *Sheet Metal Industries*, v. 32, no. 339, July 1955, p. 513-520.

Uses of television in testing equipment, control of mechanical handling, and metal processing operations. Photographs, diagrams. 6 ref.

12718* Germanium Power Rectifiers. Joseph T. Cataldo and Noel Ile. *Tele-Tech & Electronic Industries*, v. 14, sec. 1, Aug. 1955, p. 96-97.

Unique forward and reverse characteristics of these rectifiers provide power conversion efficiencies of more than 90%. Units show negligible aging effects. Photographs, graphs.

12719* Influence of the Space Charge During the Propagation of Intense Beams of Charged Particles. **Vliianie ob'emnogo zariada pri rasprostranenii intensivnykh puchkov zariazhennykh chastits.** (Russian.) M. D. Gabovich. *Uspekhi Fizicheskikh Nauk*, v. 56, no. 2, June 1955, p. 215-256.

Limitation of current and distribution of potential in the beam. Neutralization of space or bulk charge by the action of the charged particles of opposite sign. Graphs, diagrams, tables. 81 ref.

12720* The Vacuum Tube and Semiconductors. **Le tube à vide et les semi-conducteurs.** (French.) J. Laplume. *Vide*, v. 10, no. 56, Mar.-Apr. 1955, p. 2-8.

Comparative study of their advantages and disadvantages. Table.

12721* Semiconductors. **Les semi-conducteurs.** (French.) W. Shockley. *Vide*, v. 10, no. 56, Mar.-Apr., 1955, p. 9-26.

General description of five types of imperfections occurring in semiconductors: excess electrons, holes, "deathniums," donors, and acceptors. Diagrams.

12722* Contribution to the $1/f$ Law on the Noise of Semiconductors. **Beitrag zum $1/f$-Gesetz beim Rauschen von Halbleitern.** (German.) H. Schönfeld. *Zeitschrift für Naturforschung*, v. 10a, no. 4, Apr. 1955, p. 291-300.

Distinction between electrical noise of metallic conductors and that of semiconductors; theoretical explanation of the law as applied to semiconductors. Graphs, table. 13 ref.

12723* Theory of the Magnetic Barrier Layer in Semiconductors. **Zur Theorie der magnetischen Sperrschicht in Halbleitern.** (German.) O. Madelung, L. Tewordt, and H. Welker. *Zeitschrift für Naturforschung*, v. 10a, no. 6, June 1955, p. 476-488.

Mathematical analysis of the theory and the possibility of expanding it. Graphs. 11 ref.

12724* Magnetic Barrier Layers in Germanium II. **Magnetische Sperrschichten in Germanium II.** (German.) E. Weisshaar. *Zeitschrift für Naturforschung*, v. 10a, no. 6, June 1955, p. 488-495.

Experimental verification of magnetic barrier layer theory. Method and procedure. Graphs, diagram. 7 ref.

12725* Gallium-Arsenic Photoelement. **GaAs-Photoelement.** (German.) R. Gremmelmaier. *Zeitschrift für Naturforschung*, v. 10a, no. 6, June 1955, p. 501-502.

Attempts to transform solar energy in electricity by means of a Ga-As photoelement. Graphs. 4 ref.

12726* Bipolar Diffusion in Semiconductors With Considerable Currents. **Bipoliarnaia diffuziia v poluprovodnikakh pri znachitel'nykh tokakh.** (Russian.) K. B. Tolpygo and I. G. Zaslavskaia. *Zhurnal Tekhnicheskoi Fiziki*, v. 25, no. 6, June 1955, p. 955-977.

Inversion of conductivity sign due to contact field or nonhomogeneous composition of admixture; forward direction of current in a flat or hemispherical contact; role of penetration by current bearers of one sign into semiconductor zone with current bearers of opposite sign. Graphs, tables. 6 ref.

12727* Properties and Structure of Ternary Semiconductor Systems. **Svoistva i struktura troinykh poluprovodnikovykh sistem. I.** Electrical Properties and Structure of Some Materials in a System Tl-Sb-Se. **Elecktricheskie svoistva i struktura nekotorykh materialov v sisteme Tl-Sb-Se.** (Russian.) B. T. Kolomiets and N. A. Goriunova. *Zhurnal Tekhnicheskoi Fiziki*, v. 25, no. 6, June 1955, p. 984-994.

Sign of the carriers, thermal e.m.f.; conductivity and photoconductivity. Graphs, tables, phase diagrams, micrographs. 2 ref.

12728* New Method of Measuring the Thermal Characteristics of Semiconductors. **Novyi metod izmereniia termicheskikh kharakteristik poluprovodnikov.** (Russian.) M. A. Cherniakova and A. F. Chudnovskii. *Zhurnal Tekhnicheskoi Fiziki*, v. 25, no. 6, June 1955, p. 1013-1018.

Includes diagrams. 5 ref.

Books and Miscellaneous Publications

12729 Basic Processes of Gaseous Electronics. Leonard B. Loeb. 1012 p. 1955. University of California Press, Los Angeles. (QC711 L82b)

Deals with the basic atomic, electronic, molecular, and kinetic mechanisms leading to the electrical behavior of gases and is directed primarily to the physicist, chemist, or engineer who must understand, know, and use such data with minimal difficulty.

12730 Electronic Semiconductors. **Elektronische Halbleiter.** (German.) Eberhard Spenke. 379 p. 1955. Springer-Verlag Publishing House, Berlin. (TK3376 Sp34e)

Comprehensive study of the conducting mechanism of electronic semiconductors; principles of rectifiers and transistors, and the theoretical bases of semiconductor physics.

12731 Research Services and Investigations on Subminiature Multielement Diodes and Bistable Elements for Microtronic Circuits. PB 117104. 22 p. 1954. Library of Congress, Publications Board Project, Washington 25, D. C.

Work covering the period Oct. 23, 1953, to Dec. 23, 1954 was principally concerned with the mechanical aspects of point-contact devices and related Au-bonded devices. Other problems dealt with were the use of radioactive tracers to follow the transfer of impurities during forming and bonding, growth of Si single crystals, and development of methods for obtaining specifically doped Au-wire of otherwise high purity. Photographs, graphs, diagrams, tables.

See also:

12482 (ceramic electron tubes)
12682 (electroforming in electronic engineering)
12809 (pulse amplitude discriminators)
12811 (semiconductors for bolometers)
13209 (dislocations in germanium)
13283 (semiconducting properties of Ge)
13432 (conductivity of Cd S crystals)

ENGINEERING ECONOMICS

12732* Technical Foundations of the Primary and Transformation Industries in Latin America. **Os fundamentos teenicos da indústria primária e de transformação na América Latina.** (Portuguese.) Edmundo de Macedo Soares E Silva. *ABM (Boletim da associação brasileira de metais)*, v. 11, no. 38, Jan. 1955, p. 5-30.

Views by a leading Brazilian authority on natural resources, particularly for metallurgical purposes, consumer markets, exchange among Latin-American countries and with other countries; acute problems in know-how and finance. Tables. 14 ref.

12733* **The Cyclic Flow of Metals.** Clement Blazey. *Australasian Engineer*, 1955, May, p. 54-59.

Review of cycles in production and use of metallic objects, followed by scrapping, reworking, and re-use; effects of scrap quality; economic factors; conservation of resources. Flowsheets.

12734 **Replacement Analysis by Capitalized Costs.** Frederic C. Jelen. *Chemical Engineering*, v. 62, Aug. 1955, p. 181-188.

Principles in the economics of replacement of equipments; methods of cost analysis. Graphs, table. 5 ref.

12735 **Chemical Companies Go South.** *Chemical and Engineering News*, v. 33, July 11, 1955, p. 2884-2887.

A glimpse of chemical development currently active in Dixieland. Maps.

12736 **Role of Research in Economic Growth.** Raymond H. Ewell. *Chemical and Engineering News*, v. 33, July 18, 1955, p. 2980-2985.

Role of technological advances in our economy, growth rate of research expenditures, correlation of expenditures and national product, and contribution of research are discussed. Graphs, table.

12737* **Use of Electricity in the Steel Industry.** W. F. Cartwright. *Engineer*, v. 200, July 22, 1955, p. 116-117.

Study of the ways in which the Fe and steel industry affects the national electrical generating industry now and in the future. Tables.

12738 **Quality Metal and Cost Reduction Mark History of Aluminum Production.** F. C. Frary. *Journal of Metals*, v. 7, Aug. 1955, p. 885-888.

Historical review of economic aspects of various methods of ore concentration and refining techniques. Photographs, diagrams.

Books and Miscellaneous Publications

12739 **America's Needs and Resources.** J. Frederic Dewhurst. 1148 p. 1955. The Twentieth Century Fund, New York. (HC106 T91a2)

Survey of demands and capabilities of the American economy. Includes statistics and trends in production, consumption, government, foreign trade, and natural resources.

12740 **A Growth Survey of the Atomic Industry 1955-1965.** 64 p. 1955. Atomic Industrial Forum, New York. (QC792 At71g)

A survey of private nuclear research and development and a projection of the nuclear power fiield.

12741 **The Economic Development of Jamaica.** 288 p. 1952. Johns Hopkins Press, Baltimore. (HC157 In8j)

An objective study of the development requirements of Jamaica in consideration of its growing population and recommendations of ways and means of meeting these requirements in the light of the resources that are available or could be mobilized.

FLUID MECHANICS

12742 **Liquid Films in Viscous Flow.** Melbourne L. Jackson. *A.I.Ch.E. Journal*, v. 1, June 1955, p. 231-240.

Studies made by using a Geiger counter with labeled fluid films. Tables, graphs, diagrams. 23 ref.

12743* Damped Rotation Oscillations of a Sphere in a Viscous Fluid. **Oscillations de rotation amorties d'une sphère dans un fluide visqueux.** (French.) Claire Clarion. *Comptes rendus*, v. 240, no. 21, May 23, 1955, p. 2049-2051.

Relations established for the free oscillating movement of an oscillating sphere around one of its diameters. Graph. 5 ref.

12744 **Some Factors Affecting Fluidity of Metals.** D. V. Ragone, C. M. Adams, and H. F. Taylor. Paper from THE 1955 HEAT TRANSFER AND FLUID MECHANICS INSTITUTE. 33 p. 1955. University of California, Los Angeles. (QC320 H35p)

Equations were derived relating fluidity of pure metals, to metal properties and test variables. Fluidity was found to vary directly with channel diameter, volumetric heat of fusion, applied pressure head, and superheat. Fluidity varied inversely with friction factor, temperature difference between metal and mold, and heat-absorbing ability of the mold. Change in viscosity was to have but a small effect. Graphs, tables, diagrams. 46 ref.

12745 **The Structure of Turbulence in Fully Developed Pipe Flow.** John Laufer. *U. S. National Advisory Committee for Aeronautics, Report* 1174, 1954, 18 p. (TL521 Un3r)

Measurements, principally with a hot-wire anemometer, were made in fully developed turbulent flow in a 10-in. pipe at speeds of approximately 10 and 100 ft. per sec. Graphs. 18 ref.

Books and Miscellaneous Publications

12746 **The 1955 Heat Transfer and Fluid Mechanics Institute.** Papers individually paged. 1955. University of California, Los Angeles. (QC320 H35p)

Twenty papers given at the University of Calif., Los Angeles on heat transfer and physics of flow of gases, liquids, and metals. Tables, photographs, graphs, diagrams. 231 ref.

FOOD TECHNOLOGY

12747* **Freeze-Dried Meat. I. Preparation and Properties.** A. L. Tappel, A. Conroy, M. R. Emerson, L. W. Regier, and G. F. Stewart. *Food Technology*, v. 9, Aug. 1955, p. 401-405.

Study of the preparation, food properties, and storage stability of freeze-dried meats. Diagrams, graphs, tables. 13 ref.

See also:

12439 (utilization of proteins)

FUELS AND COMBUSTION

12748 **Cetane Improver Additives for Diesel Fuels.** W. H. Hubner. *American Society of Mechanical Engineers, Paper No.* 55—OGP-12, 1955, 7 p. + 2 plates. (TJ1 Am35p)

Characteristics and engine tests of fuel additives. Table, graphs.

12749 **Improved Plastometer for Studying Agglutinating Behavior of Caking Coals.** G. L. Barthauer. *Analytical Chemistry*, v. 27, June 1955, p. 969-971.

Applicable to the investigation of fludized coal carbonization. Graphs, diagrams. 3 ref.

12750* The Reactivity of Coke With CO_2 in the Temperature Range of 1000-1200 C. **Die Reaktivität von Koks gegan CO_2 im Temperaturbereich 1000-1200°C.** (German.) A. Dahme and H. J. Junker. *Brennstoff-Chemie*, v. 36, nos. 13-14, July 13, 1955, p. 193-199.

Apparatus for determining the reaction-rate constant and energy of activation of fine granular cokes; effects of type and grain size of coke on its reactivity. Diagram, photograph, graphs, tables, micrographs. 8 ref.

12751* The Flames of Liquid- or Gas-Fuel Industrial Furnaces. **Les flammes de fours industriels à combustibles liquides ou gazeux.** (French.) Robert Durand and Cohen-de-Lara. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques*, v. 12, no. 5, 1955, p. 961-977.

Turbulent diffusion of a gas jet in an unlimited space; method of injecting fuel into industrial furnaces; study of low-calorie-gas flames of open-hearth furnaces. Graphs, diagrams, table.

12752* Note on a New Practical Method of Estimating the Effectiveness of Detergent Additives in Oils for Diesel Engines. **Note sur une nouvelle méthode pratique d'estimation de l'efficacité des additifs détergents dans les huiles pour moteurs Diesel.** (French.) Bernard Bernelin and Robert Courtel. *Comptes rendus*, v. 240, no. 22, June 1, 1955, p. 2140-2142.

Relationship between flocculation temperature and C deposits in the engine. Graphs.

Fuels and Combustion

12753* New Methods of Evaluating the Coking Properties of Coal. **Neue Methoden zur Beurteilung der Verkokbarkeit von Kohlen.** (German.) H. Echterhoff. *Erdöl und Kohle,* v. 8, no. 5, May 1955, p. 294-298.

New devices for determining the degasification and fusing behavior of different types of coal. Diagram, photographs, graphs.

12754 Structure of Coke. I. Structure and Properties of a Blast Furnace Coke. Katsuya Inouye and Hideo Tani. *Fuel,* v. 34, July 1955, p. 356-362.

Variation of physical properties and internal structure with distance from the coke oven wall. Correlation of structure with chemical activity of the coke. Graphs. 14 ref.

12755* Application of Selective and Petrographic Treatment for the Preparation of Coal for Coke Production and for Improvement of Coke Quality. **Die Anwendung der selektiven und petrographischen Aufbereitung zur Verbreiterung der Kokskohlengrundlage und zer Verbesserung der Koksbeschaffenheit.** (German.) Carl Abramski. *Glückauf,* v. 91, nos. 25-26, June 18, 1955, p. 714-727.

Applicability and advantages of the Longwy-Burstlein method to German coke industry. Tables, photographs, diagrams, graphs. 8 ref.

12756* New Points of View Concerning Sampling With Particular Consideration of Reduction Material (Coke and Coal). **Noen synspunkter ved prøvetaking med spesielt henblikk på redukjonsmaterialer (kull og koks).** (Norwegian.) F. L. Christiansen. *Tidsskrift for Kjemi, Bergvesen og Metallurgi,* v. 15, no. 5, 1955, p. 78-84.

Reviews modern German, British, and American methods of sampling. Importance of statistical analysis in sampling. Graphs.

12757 Effect of Hydrocarbon Structure on Reaction Processes Leading to Spontaneous Ignition. Donald E. Swarts and Charles E. Frank. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3384, July 1955, 23 p. (TL570 Un3t)

Includes tables, graphs. 14 ref.

GEOLOGY AND MINERALOGY

12758* Some Biogeochemical Investigations in Eastern Canada. Harry V. Warren and Robert Delavault. *Canadian Mining Journal,* v. 76, July 1955, p. 49-54.

Studies of the compositions of plants in an effort to locate Cu and Zn ores. Tables.

12759* Contribution to the Study of X-Ray Absorption by Quartz Crystals in the Vicinity of the Bragg Angle. **Contribution à l'étude de l'absorption des rayons X par des cristaux de quartz au voisinage de l'angle de Bragg.** (French.) Gilbert Barrère. *Comptes rendus,* v. 240, no. 19, May 9, 1955, p. 1907-1909.

Experimental results are compared with corresponding results deducted from the dynamic theory. Graphs. 7 ref.

12760* Two Methods for Visual Evaluation in the Quantitative Spectrographic Analysis of Minerals. **Zwei Verfahren zur visuellen Auswertung bei der quantitativen spektrographischen Mineralanalyse.** (German.) Fr. Hegemann and H. Kostyra. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 8, no. 7, July 1955, p. 319-325.

Method using standard tables of O. Leuchs and method of standard paper density of N. W. H. Addink. Advantages, method of operation, and max. errors. Table, graphs, diagrams, spectrograms. 14 ref.

GEOPHYSICS

12761 Cosmic-Ray Intensity Above the Atmosphere at High Latitudes. L. H. Meredith, J. A. Van Allen, and M. B. Gottlieb. *Physical Review,* v. 99, ser. 2, July 1, 1955, p. 198-209.

Investigation to make an absolute measurement of the total intensity of charged primary cosmic rays down to the lowest feasible value of magnetic rigidity. Tables, map, diagram, graphs. 33 ref.

12762 Eighth Progress Report on Marine Borer Activity in Test Boards Operated During 1954. *U. S. Department of Navy, Report No.* 9440, *Contract No.* NOy-81072, Mar. 15, 1955, 77 p. (TC201 C53p)

Test and evaluation procedures. Intensity of marine borer attack as shown by test boards operated from 1936 to 1954. Graphs.

Books and Miscellaneous Publications

12763 Sun, Sea and Sky. Irving P. Krick and Roscoe Fleming. 248 p. 1954. J. B. Lippincott, New York. (QC981 K89s)

Non-technical treatise on meteorology, weather forecasting, and cloud seeding.

GRAPHIC ARTS

12764* Recent Concepts on the Role of the Active Substances of Photo Gelatins in the Manufacture of Photo Emulsions. **Újabb nézetek a fotozselatinok aktív anyagainak szerepéről fotoemulziók gyártásánál.** (Hungarian.) Ferenc Evva. *Magyar Kémikusok Lapja,* v. 10, no. 6, June 1955, p. 182-190.

Elements producing light sensitivity; role of S content and the reduction effect of gelatin compounds; characterization of highly-sensitive emulsions. Tables, graphs. 41 ref.

Books and Miscellaneous Publications

12765 Management in the Graphic Arts. 62 p. 1954. Carnegie Institute of Technology, School of Printing Management, Pittsburgh. (Z119 C21.6m)

Three papers, from conference proceedings, on factors to be considered in making plant location surveys and work flow in jobbing production as related to plant layout.

12766 Studies, Research, and Investigations to Determine the Spectral Sensitivity of Dichromated Albumin. R. W. Koch, D. J. Byers, R. M. Schaffert, and W. T. Reid. PB117345. Final Progress Report, June 1, 1950 through Feb. 29, 1952. 59 p. Library of Congress, Publication Board Project, Washington, D. C.

Sensitometric data obtained for films, prepared from sensitized solutions of varying pH values, dried, irradiated, and measured in a specific atmosphere. Method, materials, and instruments are reviewed, and results are given for initial investigations to evaluate the applicability of the method in determining spectral sensitivity of other photosensitive coating materials. Graphs, tables.

HEAT POWER

12767 The Comparison of the Fatigue Characteristics of New and Used Crankshafts. J. L. Ciringione. *American Society of Mechanical Engineers, Paper No.* 55—OGP-5, 1955, 7 p. + 1 plate. (TJ1 Am35p)

Effect on fatigue strength of various methods of reconditioning of worn crankshafts. Table, graphs, photographs.

12768 Development of a Large Two-Cycle Gas Engine. E. R. Brater. *American Society of Mechanical Engineers, Paper No.* 55—OGP-6, 1955, 6 p. + 9 plates. (TJ1 Am35p)

Design and fabrication of spark-ignited, loop-scavenged engine. Photographs, graphs, diagrams.

12769* Metallurgical Problems of Modern Steam Turbines and Alternators. F. Buckley. *Engineering Journal,* v. 38, July 1955, p. 919-928.

Problems of the metallurgist in providing materials used in modern steam power plants. Photographs, diagrams.

12770* Cast Metals in Military Naval Construction and Particularly in the Construction of Propulsive Apparatuses. Conditions for Their Examination and Acceptance. **Les métaux coulés dans la construction navale militaire et plus spécialement dans la construction des appareils propulsifs. Les conditions de leur contrôle et de leur recette.** (French.) Jean Tigeot. *Fonderie,* 1955, no. 113, June, p. 4543-4550.

Discusses alloys used in military naval construction and necessary qualities of different pieces; γ-ray radiographic testing. Diagrams, radiographs. 4 ref.

12771* Inspection, Explosion and Breakdown of Boilers and Pressure Vessels. J. Eyers. *Institution of Mechanical Engineers, Proceedings*, v. 169, no. 8, 1955, p. 181-188 + 8 plates; disc., p. 189-203.

Diagnosis of several serious breakdowns and explosions, many of which are caused by low water conditions. Graphs, diagrams, photographs, micrographs.

12772* Aluminum Pistons—A New Approach. C. G. A. Rosen. *Railway Locomotives and Cars*, v. 129, Aug. 1955, p. 64-68.

Application to diesel locomotives requires special design and treatment to avoid ring groove wear. Graphs, diagrams, photographs.

12773 Free Convection in an Open Thermosyphon, With Special Reference to Turbulent Flow. B. W. Martin. *Royal Society, Proceedings*, v. 230, ser. A, July 12, 1955, p. 502-530.

An account of experimental work conducted on the static vertical system with a view to obtaining fundamental data regarding the flow regimes and heat-transfer rates. Diagram, graphs. 19 ref.

12774* Development of the Construction of Welded Spiral Housing for Reaction Turbines. **Evolution de la construction des bâches spirales de turbines à réaction.** (French.) Pierre Piguet. *Zeitschrift für Schweisstechnik*, v. 45, no. 7, July 1955, p. 123-126.

Disadvantages of cast iron and cast steel housings for medium and low pressure turbines. The combination of cast steel and steel sheets structural elements welded together make possible the elimination of the above disadvantages. Diagrams, photographs.

Books and Miscellaneous Publications

12775 Cycles and Performance Estimation. James Hodge. v. I. Gas Turbine Series. 329 p. 1955. Academic Press, New York. (TJ778 H66c)

A concise, balanced account of current theory and practice, dealing fully with the analysis of the thermodynamic cycles used in gas turbines for all purposes.

12776 Diesel Engine Catalog. Rex W. Wadman, editor. v. XX. 368 p. 1955. Diesel Progress, Los Angeles. (TJ795 D55.8)

A cross section of the products of the diesel industry and details on engines and auxiliary equipment available.

INFORMATION—PREPARATION AND DISSEMINATION

12777 Which Notation? *Chemical and Engineering News*, v. 33, July 4, 1955, p. 2838-2843.

A survey of the present status of the Dyson, Gruber, Silk, Wiswesser, and Crane-Berry chemical rotation systems to be considered at the IUPAC commission meeting in Zurich. Examples, tables.

12778* Using Radioisotopes for the Non-Contacting Measurement of Rolling Materials. **Použití radioaktivních zářičů pro bezdotykové měření válcovaných materiálů.** (Czech.) Jan Petr. *Hutnické Listy*, v. 10, no. 6, June 1955, p. 346-352.

Summarizes the different methods of the non-contacting measurement and gives the advantages of method using radioisotopes, especially, the use of pure β-ray sources for thickness of thin sheets and foils. Graphs. 11 ref.

Books and Miscellaneous Publications

12779 The Production and Use of Technical Reports. Bernard M. Fry and James J. Kortendick, editors. 1955. 175 p. Catholic University of America Press, Washington, D. C. (Z1001 F94p)

Editing and publication; acquisitions and dissemination; report utilization; identification, storage, and security control.

12780 Illustrated Technical Dictionary. Maxim Newmark, editor. 1954. 358 p. Philosophical Library Inc., New York. (T9 N46i)

Contains standard technical definitions of current terms in applied sciences, graphic and industrial arts, and mechanical trades; including air navigation; meteorology, shipbuilding, synthetics and plastics; with illustrations, technical data, and interconversion tables.

See also:

12498 (bibliography of the Fischer-Tropsch synthesis)

INSTRUMENTATION AND LABORATORY APPARATUS

12781 Twenty-Stage Molecular Distillation Unit. F. W. Melpolder, T. A. Washall, and J. A. Alexander. *Analytical Chemistry*, v. 27, June 1955, p. 974-977.

An automatic 1500 ml. still for analysis of heavy petroleum products. Graphs, diagrams, photograph. 8 ref.

12782 Distillation Micromethods for the Analysis of Petroleum. A. R. Javes, Christian Liddell, and W. H. Thomas. *Analytical Chemistry*, v. 27, June 1955, p. 991-996.

Apparatus for dealing with 1.0 to 5.0 ml. samples. Tables, graphs, diagrams. 3 ref.

12783 Application of Zero Grid Current Vacuum Tube Voltmeter to Measurement of pH With the Glass Electrode. Samuel Natelson. *Analytical Chemistry*, v. 27, June 1955, p. 1004-1007.

Made to measure ionic concentrations through glass and plastic sheets. Photographs, circuit diagram. 12 ref.

12784* Method to Determine the Semblance of a Molding Sand Grain. Jiro Kashima. *Casting Research Laboratory, Reports, Waseda University*, 1955, no. 6, p. 31-37.

Procedure for measuring the specific surface area of sands, using ethylene glycol or glycerine. Tables, graphs, diagram.

12785* Comparative Measurements Using Different Types of Colorimeters and Photometers. **Vergleichsmessungen mit verschiedenen Kolorimetern und Photometern.** (German.) Heinz Pohl. *Chemiker-Zeitung*, v. 79, no. 12, June 1955, p. 401-407.

Versatility of 13 European instruments are compared. Tables, diagram, photographs, ultra-violet spectra.

12786 Work on Engineering Dimensional Metrology at The National Physical Laboratory. F. H. Rolt. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. I. p. 1-17. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Research and testing of optical comparators and screw gages; flatness and straightness measurement. Diagrams, photographs.

12787 Work on Engineering Dimensional Metrology at The Mechanical Engineering Research Laboratory. D. G. Sopwith. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. I. p. 19-28. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Gaging methods in wear testing. Photographs, diagrams, map.

12788 A New Precision Internal Measuring Machine. C. O. Taylerson and A. Turner. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. I. p. 73-79; disc., p. 79-80. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Description of instrument capable of measuring the diameters of cylindrical reference ring gages to an accuracy of ± 0.00001 in. Photographs, diagrams.

12789 Pneumatic Gauging Instruments Developed at the National Physical Laboratory During Recent Years. J. C. Evans and I. G. Morgan. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. I. p. 257-279; disc., p. 280-287. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Theory of size measurement. Instruments for gaging yarns, wire, and internal diameter. Graph, diagrams, photographs. 4 ref.

Instrumentation and Laboratory Apparatus

12790 Method of Recording the Pitch Errors of Screw-Cutting Lathes. F. H. Rolt. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. I. p. 323-327; disc., p. 327-328. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Describes equipment by which lathes can be tested in the works and an autographic record obtained showing the complete periodic and progressive errors over any length of traverse required. Diagrams, graph.

12791 Apparatus for Demonstrating Errors in Movements of Machine Tool Slides. F. H. Rolt and W. F. Atkins. Paper from ENGINEERING DIMENSIONAL METROLOGY. v I. p. 347; disc., p. 347-348. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Equipment and methods for measuring straightness and flatness. Diagram.

12792 Metrology in the Horological Industry. K. H. Hume. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. II. p. 455-465; disc., p. 466-467. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Measuring equipment and procedures associated with the manufacture of instruments, clocks, and watches. Photographs, diagram. 3 ref.

12793 The Precise Establishment of Long Co-Ordinates in Factories. O. S. Reading. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. II. p. 485-488, 490-493; disc., p. 488-489. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Optical methods for avoiding flexure errors in large-sized jigs for defining straight lines. Photographs, diagram.

12794 Report on the Measurement of Large Work-Pieces, Measuring Equipment, Systems of Fits Over 500 mm. N. N. Sawin. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. II. p. 495-526; disc., p. 583-588. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Wear and margins of error of fixed gap gages. Pin, internal, and projecting hook gages. Diagrams, tables, photographs. 9 ref.

12795 Report on an Investigation for the British Standards Institution Into the Accuracy With Which Industry Measures Large Dimensions. P. W. Harrison. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. II. p. 527-536; disc., p. 583-588. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Degree of accuracy of measurements made in engineering workshops, with particular reference to large work-pieces up to nearly 80 in. in size. Diagrams, graphs, table.

12796 The Trend of Surface Measurement. R. E. Reason. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. II. p. 599-620; disc., p. 651-664. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Equipment and methods to measure errors of straightness, wavyness, or roundness; profile comparators. Flowsheet, diagrams, graphs, photographs, table. 9 ref.

12797 Two Recent Developments for Accurate Measurement of Surface Roughness. A. F. Underwood. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. II. p. 621-628; disc., p. 651-664. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Development of a roughness standard which could be used to check and calibrate any stylus-type surface roughness measuring device. Design of electronic surface roughness measuring device. Design of electronic surface measuring instrument. Photographs, graph, diagrams. 2 ref.

12798 A Furnace Scanning Periscope. Charles Burns. *Iron and Steel Institute, Journal*, v. 180, July 1955, p. 241-247 + 4 plates.

Development of a water-cooled periscope which can be inserted in an open-hearth furnace and give an effective viewpoint within the furnace walls. It can be used for still or ciné photography (normal or high-speed) or for direct visual observation. Diagrams, photographs.

12799 Open-Hearth Immersion Pyrometers. A. Goodall. *Iron and Steel Institute, Journal*, v. 180, July 1955, p. 247-254.

Review of development through three principal designs; reasons for changes; costs are calculated; lines of future development are suggested. Tables, diagrams, photographs. 3 ref.

12800 Grain Growth Observed by Electron Optical Means. (English.) G. W. Rathenau. Paper from L'ÉTAT SOLIDE. p. 55-72. 1952. Institut International de Physique Solvay, Brussels. (QC125 In7.4e)

Emission microscopy of changes in metal crystals in films; grain boundary movements; growth accompanying alloy phase transformations. Micrographs, graphs. 12 ref.

12801* Application of Contact Micro-Manometers for Vacuum and Flow Control. **Kontakt mikromanométerek alkalmazása vákuumés áramlásszabályozóként.** (Hungarian.) Iván Telcs. *Magyar Kémikusok Lapja*, v. 10, no. 6, June 1955, p. 179-181.

Describes equipment developed in the Hungarian Plastics Institute. Various modifications with a guide device connecting the scanning and control mechanisms. Diagrams.

12802 4000° F. Gas Furnace. Horace B. Drever. *Metal Progress*, v. 68, Aug. 1, 1955, p. 94-95.

A completely automatic gas-fired furnace developed in England is capable of continued operation in the range of 3200 to 4000 F, using air rather than O for combustion. Photographs.

12803 The EM 75 kV, an Electron Microscope of Simplified Construction. A. C. van Dorsten and J. B. Le Poole. *Philips Technical Review*, v. 17, Aug. 1955, p. 47-59.

This cheaper instrument, containing no vacuum tubes, has a resolving power of 100 Å. and requires only a magnetic mains stabilizer. Graphs, diagrams, photographs. 7 ref.

12804 Stress Equations for Strain Gage Rosettes. C. C. Perry and H. R. Lissner. *Product Engineering*, v. 26, July 1955, p. 207, 209, 211.

A table of equations prepared as a convenient reference for calculating significant stresses from measured strains. Tables.

12805 Surface Micro-Interferometry. J. W. Perry. *Research*, v. 8, July 1955, p. 255-261.

Survey of the evolution of interferometers on a functional basis, from the simplest unaided-vision forms to the most recent micro-interferometer developments. Graph, diagrams, photographs. 13 ref.

12806* A System for the Elimination of Absorption Errors in X-Ray Investigation With Debye-Scherrer Cylindrical Chambers. **Un sistema di eliminazione degli errori di assorbimento nelle indagini roentgenografiche con camere cilindriche Debye-Scherrer.** (Italian.) Vladimiro Scatturin, Maria Tornati, and Roberto Zannetti. *Ricerca scientifica*, v. 25, no. 6, June 1955, p. 1447-1460.

Use of diluting powders to obtain corrections for fractional error in interplanar distances. Tables, graphs. 13 ref.

12807* Temperature Measurement in the Open-Hearth Steel Plant. **Tmperaturmessungen im Siemens-Martin-Stahlwerk.** (German.) Günther Boos and Jacob Willems. *Stahl und Eisen*, v. 75, no. 14, July 14, 1955, p. 900-906.

Experiments with immersion thermocouples on three steel grades from tapping to pouring; temperature difference between black and color temperature and conclusions to be drawn for the steel quality; temperature loss during ladling. Graphs. 18 ref.

12808 Pyrometry—Some Suggestions for Maintenance. Leo Walter. *Steel Processing*, v. 41, July 1955, p. 435-438.

High temperature optical, radiation millivolt pyrometers, care of thermocouple instruments, maintenance, and correct installation are discussed. Diagrams, photographs.

12809 Pulse Amplitude Discriminators Employed in Nuclear Research. Herbert G. Weiss. *U. S. Atomic Energy Commission, AECD*-3314, Sept. 1948, 36 p. (UF767 Un3m)

Several early photographic methods and the later improved electronic devices are illustrated and their operation explained. Describes several simple discriminator circuits and their use in obtaining integral and differential bias curves. Graphs, circuit diagrams, oscillograms, photographs.

12810 Calibration of Strain-Gage Installations in Aircraft Structures for the Measurement of Flight Loads. T. H. Skopinski, William S. Aikens, Jr., and Wilber B. Huston. *U. S. National Advisory Committee for Aeronautics, Report* 1178, 1954, 29 p. (TL521 Un3r)

A basic calibration procedure is developed for calibrating strain-gage installations on aircraft structures which permits the measurement in flight of the shear, bending moment, and torque. Diagrams, graphs, tables. 12 ref.

12811* Semiconductor Bolometers. **Poluprovodnikovye bolometry.** (Russian.) I. D. Konozenko. *Uspekhi Fizicheskikh Nauk*, v. 56, no. 2, June 1955, p. 283-308.

Circuits and switching arrangements; sensitivity, temperature relaxation time, and electrical noise of the bolometers; selection of semiconductors for the bolometers. Graphs, tables, diagrams. 41 ref.

12812* A Process of Measuring Constant Magnetic Fields and Constant-Field Differences and Its Application in the Research and Technology of Metals. **Ein Verfahren zur Messung von magnetischen Gleichfeldern und Gleichfelddifferenzen und seine Anwendung in der Metallforschung und Technik.** (German.) Friedrich Förster. *Zeitschrift für Metallkunde*, v. 46, no. 5, May 1955, p. 358-370.

Principle of operation and design of precision-field strength meter and its uses in geophysics, nondestructive testing, sorting, electrochemical and electrical engineering. Graphs, diagrams, photographs. 20 ref.

12813* A New Astatic Magnetometer for Measuring Ferromagnetic Plate Specimens in Direct and Alternating Currents. **Über ein neues astatisches Magnetometer zur Messung ferromagnetischer Blechproben in Gleich- und Wechselfeldern.** (German.) Kurt Mellentin and Heinrich Lange. *Zeitschrift für Metallkunde*, v. 46, no. 6, June 1955, p. 450-456.

Description of the instrument; structural details; theoretical bases; field of application. Table, graphs, photograph, diagrams. 7 ref.

12814* An Isothermal Calorimeter for Metallurgical Research. **Ein isotherm arbeitendes Kalorimeter für metallkundliche Untersuchungen.** (German.) Jörg Dichl and Reinhold Braun. *Zeitschrift für Metallkunde*, v. 46, no. 6, June 1955, p. 457-461.

Comparative analysis of different calorimetric methods; experimental determination of heat hardening isotherms of Al-Ag alloy. Graphs, diagrams. 13 ref.

12815* Magnetic Balance for Measuring Susceptibility. **Magnetische Waage zur Messung de Suszeptibilitat.** (German.) Heinrich Beisswenger and Ernst Wachtel. *Zeitschrift für Metallkunde*, v. 46, no. 7, July 1955, p. 504-507.

Construction details of a balance used in metallographic measurements permits separation between para- and ferromagnetic components of specimens. Graphs, diagrams. 5 ref.

12816* Highly Sensitive Thermomagnetic Apparatus for Studying Phase Transformations in Steel. **Vysokochuvstitel'naia termomagnitnaia ustanovka dlia izucheniia fazovykh prevrashchenii v stali.** (Russian.) A. N. Alfimov. *Zhurnal Tekhnicheskio Fiziki*, v. 25, no. 6, June 1955, p. 1105-1110.

Operation of apparatus; amount of ferromagnetic phase required; peculiarities in curves for martensitic transformation. Table, diagrams, photograph. 2 ref.

Books and Miscellaneous Publications

12817 Phase Contrast and Interference Contrast. **Le contraste de phase et le contraste par interférences.** (French.) Maurice Françon, editor. 264 p. 1952. Éditions de la "Revue d'Optique Théorique et Instrumentale", Paris. (QC449 F84c)

Twenty-eight French and English papers delivered at the meeting of International Commission of Optics at Paris, May 15-21, 1951. Reports cover methods, equipment, theory, and applications of phase and interference contrast microscopy.

12818 The Phase-Contrast Microscope and the Interferential Microscope. **Le microscope a contraste de phase et le microscope interférentiel.** (French.) Maurice Françon. 149 p. 1954. Centre National de la Recherche Scientifique, Paris. (QC449 F84m)

Theoretical study of the formation of images and methods of observing transparent objects.

See also:

12573 (apparatus for differential thermal analysis)
12749 (improved plastometer)

LUBRICATION AND FRICTION

12819 Colorimetric Determination of *N*-Phenyl-1-naphthylamine in New and Used Oils. W. S. Levine and W. A. Marshall. *Analytical Chemistry*, v. 27, June 1955, p. 1019-1022.

Oil in acetone reacts with diazotized-*p*-nitroaniline. Tables, graph. 4 ref.

12820* Flocculation Phenomena of Carbon Particles in Lubricating Oils Under the Influence of Temperature. **Note sur les phénomènes de floculation des particules charbonneuses dans les huiles de graissage sous l'influence de la température.** (French.) Bernard Bernelin. *Comptes rendus*, v. 240, no. 21, May 23, 1955, p. 2073-2075.

Study of the action of heat on the state of the carbon suspensions in lubricating oil in a Diesel engine. 1 ref.

12821* Increasing the Carrying Capacity of the Film of Lubricant by Rheologically Active Additions. **Die Erhöhung der Tragfähigkeit des Schmierfilmes durch rheologisch wirksame Zusätze.** (German.) Hans Umstätter. *Erdöl und Kohle*, v. 8, no. 5, May 1955, p. 305-307.

Improvement of the intrinsic viscosity of lubricating oils by dissolving lyophilic colloids; description of intrinsic-viscosity meter and bearing-testing machine. Photographs, diagrams, graphs. 2 ref.

12822* Experiences With the Four-Ball Apparatus for Testing Lubricants. **Erfahrungen mit dem Vierkugel-Apparat zur Beurteilung von Schmierstoffen.** (German.) H. Diergarten, J. Stöcker, and H. Werner. *Erdöl und Kohle*, v. 8, no. 5, May-1955, p. 312-318.

Experiments with Boerlage's lubricant tester to determine the effect of the hardness and composition of the balls on the results. Photographs, diagrams, tables, graphs, micrographs. 13 ref.

12823* Lubricating-Oil Problems in Large Turbogenerators. **Schmierölfragen bei grossen Turbinensätzen.** (German.) Edgar Knoop. *Erdöl und Kohle*, v. 8, no. 5, May 1955, p. 318-322.

Behavior and required properties of steam-turbine lubricating oils; effect of additives on lubricating properties. Diagrams, graphs, photographs, tables.

12824 Properties of Chlorofluorocarbon Oils. *Industrial Chemist and Chemical Manufacturer*, v. 31, June 1955, p. 271-272.

Describes three grades of British products. Tables.

12825 New Powdered Material Reduces Bearing Wear. Stanley Hodge. *Iron Age*, v. 176, Aug. 11, 1955, p. 87-89.

Micro-sized particles of a Cu-Pb mixture, added to the regular machine lubricant, recondition bearings while the machines run. Other uses for the powdered metal mixture include coolant additions for longer tool life and to reduce wear in hydraulic valves. Photographs.

12826 What Type of Grease for That Application? W. A. Magie, II and W. C. Bryant. *Iron and Steel Engineer*, v. 32, July 1955, p. 90-93; disc., p. 93-94.

Results of tests indicate that for steel plant use a minimum of four distinct types of grease are needed to obtain top performance. Tables.

12827* Evaluating Bearing Materials Under Boundary Lubrication. B. Lunn. *Lubrication Engineering*, v. 11, July-Aug. 1955, p. 255-259; disc., p. 259-260.

Test to determine the ability of a metal to develop a nonscoring boundary film. Diagrams, graphs, photographs, tables. 10 ref.

Lubrication and Friction

12828 Teflon-Impregnated Bearings for Service in Water. H. B. Nudelman and Cord H. Sump. *Metal Progress*, v. 68, Aug. 1, 1955, p. 112-113.

Porous stainless steel bearings impregnated with Teflon are recommended for service where hot water is used for lubrication. Photographs.

12829* Testing Lubricants for Their Lubricating Properties With the Wieland Machine and a "Four Ball" Apparatus. **Prüfung von Schmiermitteln auf ihre Schmierfähigkeit mit dem Wieland- und Vierkungelapparat. I.** (German.) M. Brunner and R. Pedrini. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 21, no. 6, June 1955, p. 169-178.

Structural details and method of operation; comparison of test data with those from operational experience. Photographs, graphs, diagram. 4 ref. (To be continued.)

12830 A Guide to Bearing and Bushing Choice. I. Bearing Materials. II. Picking the Right Bearing. J. B. Mohler. *Steel*, v. 137, Aug. 1, 1955, p. 76-78; Aug. 8, 1955, p. 88-89.

Provides and tabulates necessary data. Tables, photographs.

See also:

12516 (lubricant analysis)

MECHANICAL ENGINEERING

12831 A Swept Cantilever Box Beam With Two Spars and Skew Ribs. B. R. Noton. *Aircraft Engineering*, v. 27, July 1955, p. 204-215.

Static tests of stress and strain distributions, and torsion and flexural stiffness. Comparisons were made with bending theory. Diagrams, photographs, graphs, tables. 24 ref.

12832 The Influence of Tap-Drill Size and Length of Engagement Upon the Strength of Tapped Holes. C. J. Oxford, Jr. and J. A. Cook. *American Society of Mechanical Engineers, Paper No.* 54–A-85, 1954, 13 p. + 5 plates. (TJ1 Am35p)

Influence of minor diameter of threaded hole on strength of threaded assembly. Table, diagrams, graphs. 9 ref.

12833* Raw Materials in the Automotive Industry. J. S. Anderson. *Australasian Engineer*, 1955, May, p. 60-71.

Detailed survey of materials, with reference to specific applications; requirements of Australian automobile industry. Tables, graph.

12834 Numerical Data Controls Milling Machine. *Automatic Control*, v. 3, July 1955, p. 20-21.

Pre-calculated numerical information is punched on paper tape, then automatically converted to time-coordinated command signals which control the position of the axes of the machine. Photographs.

12835* The Axial-Flow Compressor in Industry. A. Schramm. *Brown Boveri Review*, v. 41, no. 11, Nov. 1954, p. 395-404.

Performance characteristics of compressors for use in blast furnaces, Bessemer converters, chemical plants, and wind tunnels. Graphs, photographs, diagram. 14 ref.

12836 The Industrial Use of High-Energy Materials. C. H. Carlton, F. A. Warren, and J. H. Wiegand. *Chemical Engineering Progress*, v. 51, July 1955, p. 335-338.

Applications of explosives in riveting, stud driving, metal forming, oil well perforating, and other operations. Diagrams, graphs. 14 ref.

12837 Product Design for Organic Finishing. F. C. Ashford. *Electroplating and Metal Finishing*, v. 8, July 1955, p. 254-257.

Correlation of finishing scheme with form of the article; effects of component shape; color selection. Diagrams, photograph. 1 ref.

12838* Installation of a 2000-Ton Forging Press. *Engineer*, v. 200, July 15, 1955, p. 71-74.

Structural alterations and problems involved when the headroom required exceeds that normally available. Photographs, diagrams.

12839* Aluminium-Alloy Concave-Pointed Rivets. Small Loads Suffice for Closing. J. D. Haddon. *Engineering*, v. 180, July 15, 1955, p. 79-83.

Concave rivets, closed with a comparatively small squeeze load, may be successfully used in joints in which the rivet is chiefly subjected to shear, if a small point length is provided to prevent the rivet from pulling-out of its hole before it fails by shear. Diagrams, graphs, photographs, tables. 4 ref.

12840 Measurement in the Field of Interchangeable Manufacture by Gauges or Indicating Appliances. G. Berndt. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. I. p. 35-55; disc., p. 55-59, 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Validity of use of go and no-go gages, and indicating instruments for shafts. Diagrams, photographs. 8 ref.

12841 Recent Developments in Rolling Gear Testers. J. A. Horne. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. II. p. 379-404; disc., p. 404-413, 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Range and accuracy of instruments for determination of backlash and eccentricity, and smoothness of tooth action. Diagrams, photographs, graphs. 3 ref.

12842 Small Screw Threads. P. R. Brierley. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. II. p. 469-482; disc., p. 482-483. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

National and international systems; thread forms; measuring techniques. Table, graphs, diagrams.

12843 Large Scale Metrology. V. B. Hessen. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. II. p. 563-576; disc., p. 538-588. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Instrumentation and measuring system for positioning equipment components over distances up to 30 ft. Description and principle of application of a tape gage, which allows repeated measurements over a pre-determined length to an accuracy of ±0.003 in. up to a max. of 20 ft. Diagrams, table.

12844 Approach to Foundry Mechanical Handling. C. M. G. Wallwork. *Institute of British Foundrymen, Proceedings*, v. 47, 1954, p. 34B-44B; disc. p. 44B-46B. (TS200 In7p)

Use of work-study methods to determine handling equipment needs and economics. Tables, flow chart.

12845 Process Control Analysis. VI. Analytic Solutions. Millard H. Lajoy and E. Allen Baillif. *Instruments and Automation*, v. 28, July 1955, p. 1114-1118.

For many types of controlled systems, the defining equations are ordinary, linear, and of low order–and have constant coefficients. Conventional analytic solutions of these equations are presented with practical examples. Diagrams. (To be continued.)

12846 New Steam and Power Facilities — Ohio Steel Works, U. S. Steel. Robert W. Worley. *Iron and Steel Engineer*, v. 32, July 1955, p. 99-101; disc., p. 101-102.

Installation of new steam generating units fueled with blast furnace gas.

12847 The Study of Materials-Handling Systems by a Lead-Shot Analogue. H. G. Jones, W. M. Davies, and P. D. Dickerson. *Iron and Steel Institute, Journal*, v. 180, July 1955, p. 255-262 + 2 plates.

Experiments using lead shot as a medium in a model or analogue gives the advantage of flowing from an orifice at a speed independent of the pressure head. The flow pattern through the conveyor system, screens, and bunkers associated with the blast-furnace and ore-preparation plant was examined on the analogue, and bottlenecks and surplus members were recognized. Table, diagrams, photographs. 6 ref.

12848 On the Buckling of Stringer Panels Including Forced Crippling. P. P. Bijlaard. *Journal of the Aeronautical Sciences*, v. 22, July 1955, p. 491-501.

Analysis considers the effective moment of inertia of the stiffeners when located on one side of the plate and the effective width of the plate at the unloaded edges, and the effects of shear deformation of the stiffener web and the flexibility of the attached flange of the stiffener. Diagrams, graphs, table. 12 ref.

12849 How to Control Perishable Tools. George Pascoe. *Machinery*, v. 61, Aug. 1955, p. 139-148.

Practices of the Ford Motor Co. in tool specifications, procurement, inspection, grinding, testing, use, and salvage. Photographs, diagram, tables.

12850 Control Tape Prepared From Numerical Data. Edgar L. McFerren. *Machinery*, v. 61, Aug. 1955, p. 178-182.

Magnetic tape—prepared electronically, directly from numerical data—is being used to automatically control a Giddings & Lewis spar- and skin-milling machine. Cams or templates are not required, less skilled machine operators can be employed, and tapes can be stored for future production needs. Photographs.

12851* Practical Design Aspects of Fatigue Limits. *Mechanical World and Engineering Record*, v. 135, July 1955, p. 294-297.

Comparison of fatigue limits of ferrous and non-ferrous metals; effects of loading conditions. Graphs, photograph.

12852 Impact Failure of Gear Teeth. Arthur J. Kauper. *Metal Progress*, v. 68, Aug. 1, 1955, p. 73-76.

Failure of transmission gear teeth was traced to variation in impact strength that followed the ingot pattern in the bar stock from which they were made. Photographs, graphs, diagrams.

12853 Experimental Stress Analysis Applied to Propeller Blades. Percy W. Ott. *News in Engineering at Ohio State University*, v. 27, July 1955, p. 21-25.

Blade requirements and structure. Use of "stresscoat" techniques. Photographs. 1 ref.

12854* Indentation Pressure of a Smooth Circular Punch. E. Levin. *Quarterly of Applied Mathematics*, v. 13, July 1955, p. 133-137.

Technique used to obtain an upper bound on the punch pressure at the moment of impending plastic indentation. Diagrams, tables. 4 ref.

12855 The Fundamentals of Progressive Tooling. J. A. Grainger. *Sheet Metal Industries*, v. 32, no. 339, July 1955, p. 485-489.

Design of press tools of the follow-on or cut-and-carry types which permit uninterrupted feeding of the stock across the die face. Photographs, diagrams.

12856* Failure of Working Pieces and Safety in Using Steels Functioning in Machine Parts. **Défaillance des pièces en exploitation et sécurité d'emploi des aciers travaillant dans les pièces de machines.** (French.) A. Fotiadi. *SIM—Documentation Métallurgique*, 1955, no. 21, Jan., Feb., Mar., p. 9-30.

Discusses different types of permanent deformation, cracks, and failure due to fatigue, and general behavior of steels under endurance conditions. Diagrams.

12857* Strain-Gage Measuring. Range of Application and Practical Utilization. **Strekklappmålinger Anvendelsesområde og praktisk utnyttelse.** (Norwegian.) Just Fr. Storm. *Teknisk Ukeblad*, v. 102, no. 20, May 19, 1955, p. 411-417.

Discussion and illustration of designs and uses of different strain-gages and extensometers. Diagrams, photographs, graph, maps, oscillograms.

12858 Transfer of Longitudinal Load From One Facing of a Sandwich Pannel to the Other by Means of Shear in the Core. Charles B. Norris and Kenneth H. Boller. *U. S. Department of Agriculture, Forest Products Laboratory, Report No.* 1846, Apr. 1955, 30 p. (TS800 Un3.3r)

Determination of shear stresses in the core and direct stresses in the facings of a sandwich panel at points where the construction is changed or at the edge of the panel. Graphs, photographs, diagrams.

12859 Buckling of Sandwich Cylinders of Finite Length Under Uniform External Lateral Pressure. Milton E. Raville. *U. S. Department of Agriculture, Forest Products Laboratory, Report No.* 1844-B, May 1955, 30 p. + 15 plates. (TS800 Un3.3r)

Theoretical analysis is made in an attempt to obtain a solution for the critical load on circular sandwich cylinders. Tables, diagrams, graphs. 6 ref.

12860 Shearing Effectiveness of Integral Stiffening. Robert F. Crawford and Charles Libove. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3443, June 1955, 37 p. (TL570 Un3t)

Values of coefficients for defining the effectiveness of integral stiffeners in resisting shear deformations of the plate of which they are an integral part are presented for a wide range of proportions of rectangular stiffeners with circular fillets. Graphs, diagrams. 11 ref.

12861* Mechanics of Tool Engineering. XXI. Fundamentals of Plant Layout. Andrew E. Rylander. *Western Machinery and Steel World*, v. 46, July 1955, p. 65-70.

Deals with the subject of plant layout illustrated by detailed planning of a plant for machining automotive crankshafts. Diagrams, photographs.

Books and Miscellaneous Publications

12862 Strength of Materials. Pt. I. Elementary Theory and Problems. S. Timoshenko. 3rd Ed. 442 p. 1955. D. Van Nostrand Co., Inc. New York. (TA405 T48s3)

Considers tension and compression, stress-strain analysis, bending moment and shearing force, and strain energy and impact under various loading conditions as an approach to an increased correlation between the strength of materials and engineering design.

METALLURGY

12863* Developments in Low-Alloy Steels for Welded Structures. C. L. M. Cottrell. *Alloy Metals Review*, v. 8, June 1955, p. 2-6.

Considers the factors involved and shows, by means of austenite transformation data, the influence of composition and other variables on the characteristics of some of these steels during welding. Table, graphs. 14 ref.

12864* Use of Light Metals for Construction of Hydroplanes. **Die Verwendung von Leichtmetall beim Bau von Tragflächenbooten.** (German.) E.-Fr. Gebauer. *Aluminium*, v. 31, nos. 7-8, July-Aug. 1955, p. 347-350.

Compares a hydroplane, which uses Al extensively, with other current designs. Table, graph, diagram, photographs. 3 ref.

12865 Pioneering in New Developments in a Specialty Steel Mill. H. George De Young. *American Iron and Steel Institute, Preprint*, 1955, 47 p. (TS300 Am35y)

Developments in continuous casting, scarfing, rolling, pickling, and annealing. Photographs, tables, graphs, micrographs, diagrams.

12866 Production Control of Quality Steels. Robert W. Graham. *American Iron and Steel Institute, Preprint*, 1955, 23 p. (TS300 Am35y)

Analysis of various variables in steel making and fabrication; control of composition of steels; quality control measures. Photographs, graphs.

12867* Cold Reduced, Low Carbon, Sheet Steel. N. G. Fraser and J. M. Butler. *Australasian Engineer*, 1955, June, p. 41-47.

Physical and chemical characteristics; modern practices in production and fabrication. Photographs, micrographs, tables. 3 ref.

Metallurgy

12868* Low-Frequency Induction Melting and Heating. R. K. Treloar. *Australasian Engineer,* 1955, June, p. 62-69.

Principles. History and development of the induction furnaces; present applications. Diagrams, photographs.

12869 Utah's Geneva Works: Producer of Steel for Western Industries. Charles Longenecker and Harry E. Trout. *Blast Furnace and Steel Plant,* v. 43, Aug. 1955, p. 869-908.

Availability of raw materials; coke and coal chemical division; blast and open-hearth furnaces; blooming, slabbing, structural, and strip mills; power plant and utilities; metallurgy; maintenance; transportation; industrial relations; safety program. Photographs, diagrams, tables.

12870 The Composition of Weld Metal. W. P. van den Blink. *British Welding Journal,* v. 2, July 1955, p. 285-290; disc., p. 291-292.

Surveys influence of metallurgical factors, especially in mild steel electrodes; effect of composition on properties and operative characteristics. Tables, graphs, photograph. 30 ref.

12871 Health Hazards in Chromium Plating and How to Prevent Them. W. Kohl. *Henry Brutcher Translation No.* 3490, 5 p. (Abridged from *Metalloberfläche,* v. 5, no. 10, 1953, p. 154B-155B.) Henry Brutcher, Altadena, Calif.

Ways in which chromic acid may affect the health of operators, and means for preventing serious trouble and minimizing detrimental effects in general.

12872* Commercially Pure Iron. E. N. Simons. *Canadian Mining Journal,* v. 76, July 1955, p. 66-67.

Advantages and properties of high-purity Fe; production methods; necessary precautions in fabrication procedures. Graphs.

12873* On Austenitic Malleable Iron. II. Nobuhisa Tsutsumi. *Castings Research Laboratory, Reports, Waseda University,* 1955, no. 6, p. 21-26.

Effects of Cu, Al, or Ni alloying additions on properties and structure. Tables, diagrams. 3 ref.

12874 How to Work Arc-Cast Molybdenum. *Iron Age,* v. 176, Aug. 11, 1955, p. 95-97.

High speed steel and WC tools have given good results in machining; in drawing and spinning, both metal and tools should be heated; satisfactory welds are obtained using arc, electrical resistance, percussion, and flash welding; special care is needed in grinding. Photographs.

12875 Titanium in Iron and Steel. A. E. Williams. *Iron & Steel,* v. 28, June 1955, p. 307-310.

Discusses the reactions of Ti when used in refining and as an alloying agent. Photograph, tables, graphs.

12876 Iron and Steel in Canada. Gustad P. Contractor. *Iron & Steel,* v. 28, July 1955, p. 347-351; Aug. 1955, p. 384-386.

Feasibility of establishing a primary Fe and steel industry in the lower mainland region of British Columbia and data on production in this area. Tables, maps. 25 ref.

12877 Spring Materials. *ISA Journal,* v. 2, July 1955, p. 257-260.

Data sheets on glossary of terms, alloys, properties, and applications. Table, graph.

12878 Titanium Problems and Opportunities, Spring 1955. Walter L. Finlay, C. I. Bradford, and W. E. Gregg. *Light Metals,* v. 18, July 1955, p. 230-233.

Discloses the factors which are holding back greater increases in its use in aircraft and measures for minimizing or correcting them. Graphs.

12879 How to Select Wrought Steels. John W. W. Sullivan. *Materials & Methods,* v. 42, July 1955, p. 111-126.

A manual to aid in selecting and making better and more economical use of rolled and forged steel products. It explains the factors and properties that must be considered when choosing a steel to meet the requirements of a particular application, and gives, in detail, the properties of C, alloy, stainless, and heat resisting steels. Photographs, tables. 33 ref.

12880 A New Titanium Alloy. R. J. McClintick, G. W. Bauer, and L. S. Busch. *Materials & Methods,* v. 42, Aug. 1955, p. 90-92.

Available now as forgings, bar, plate, and sheet, this Al-V-Ti alloy has usable strength up to 1000 F, high tensile and impact strengths, and good weldability. Photographs, graphs.

12881 These Hot Work Die Steels Look Promising for Aircraft Structures. Edward A. Loria. *Materials & Methods,* v. 42, Aug. 1955, p. 94-97.

Mechanical, physical, and fabrication properties of steels that may solve some high-temperature problems in high-speed aircraft. Tables, graphs. 6 ref.

12882 Standard Types of Stainless and Heat Resisting Steels. *Materials & Methods,* v. 42, Aug. 1955, p. 131.

Chemical ranges and limits for 37 types. Table.

12883 Historical Note on Sources and Uses of Beryllium. Robert F. Griffith. Paper from THE METAL BERYLLIUM. p. 5-13. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Source of minerals, recovery, source countries, development of the industry, development of uses, and outlook. Tables. 11 ref.

12884 The Role of Beryllium in the Atomic Energy Program. Robert E. Pahler. Paper from THE METAL BERYLLIUM. p. 14-23. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Applications in nuclear reactors, role of AEC in Be production, cost reduction, and availability in the U. S. Table, diagram, photographs. 6 ref.

12885 The Role of Beryllium in Industry. N. W. Bass. Paper from THE METAL BERYLLIUM. p. 24-41. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Applications, Be metals, oxides, other Be compounds, and Be as an alloying element are discussed. Tables. 13 ref.

12886 Beryllium-Rich Alloys. A. R. Kaufmann and P. Corzine. Paper from THE METAL BERYLLIUM. p. 555-569. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Reviews possible approaches to the production of an alloy without the fatal brittleness of the pure metal, yet possessing low density, combined with high strength, high melting point, and good moderating characteristics for neutrons. Diagrams, graphs, table. 26 ref.

12887 Recent Aluminium Casting Developments. L. Fletcher. *Metal Industry,* v. 87, July 8, 1955, p. 23-27.

Alloys, applications, properties, and foundry techniques. Photographs.

12888 Fabricating Titanium Sheet. *Metal Industry,* v. 87, July 15, 1955, p. 43-45.

Proposes method to make the most satisfactory parts from commercially-pure sheet, using standard machines and processes, and comparing the techniques with those used in fabricating stainless steel parts. Photographs.

12889* High-Strength Cast Irons Without Special Elements. **Les fontes résistantes exemptes d'éléments spéciaux** (French.) J. Pascal. *Métallurgie et la construction mécanique,* v. 87, no. 6, June 1955, p. 479 + 4 pages.

Field of application; composition of cast irons for particular requirement of cast machine parts. Tables, diagrams, graphs, micrographs. 52 ref.

12890 High-Strength Steel—Aircraft Requirements. Leo Schapiro. *Metal Progress,* v. 68, July 1955, p. 77.

Discusses the need for new composition or better processing methods to meet aircraft requirements.

12891 High-Strength Steel—Present Limitations. Paul M. Mozley. *Metal Progress,* v. 68, July 1955, p. 78-80.

Limitations on cleaning, plating, and surface conditioning as an illustration of the problems encountered in the use of steel, heat treated to high strengths.

12892 Tentative Standard H-Steels. *Metal Progress*, v. 68, July 1955, p. 104-B.

Translates, into a simplified chart form, the hardenability curves and data issued by the American Iron and Steel Institute. Graphs.

12893 Applications of Arc-Cast Molybdenum. N. L. Deuble. *Metal Progress*, v. 68, Aug. 1, 1955, p. 77-79.

Molybdenum is currently going into production of magnetron tubes and glass melting furnaces; nearing commercial usage are piercer points for the tubing industry, die-casting dies, ramjet nozzles, and gas-turbine parts. Photographs.

12894 New Developments in Metallurgy. Bruce S. Old. *Metal Progress*, v. 68, Aug. 1, 1955, p. 105-111.

Advances in nuclear energy, gas turbine development, electronics, steel melting, and other fields. Photographs.

12895 A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging*, v. 22, June 1955, p. 255-262.

Defines preferred orientation to "pyrometry". Diagrams, graph, table. (To be continued.)

12896* What's New in Aluminum Bronze? James S. Vanick. *Modern Castings and American Foundryman*, v. 28, Aug. 1955, p. 24-29.

Indicates modifications to composition 9D, i.e., corrosion resistance, toughness, and proportional limit, and points out applications for which they become desirable. Photographs, graphs, tables. 6 ref.

12897* The Case of the Absorbed Oxygen. Robert C. Williams and Harold W. Lownie, Jr. *Modern Castings and American Foundryman*, v. 28, Aug. 1955, p. 58-59.

Results of recent discovery explaining why castings contain more O than expected. Points out the significance of the time elapsed between casting and analyzing the Fe. Photograph, graph. 3 ref.

12898* No Chain Failures in This Foundry. Jess Hogans. *Modern Castings and American Foundryman*, v. 28, Aug. 1955, p. 62-65.

A standard procedure for procuring, inspecting, and maintaining chains and slings. Photographs, diagram.

12899 Foreign Atoms in Metals. J. D. Fast. *Philips Technical Review*, v. 16, June 1955, p. 341-351.

A review of the influence of interstitial atoms in metals and their effect on hardness and brittleness. Diagrams, graphs. 14 ref.

12900* Brasses With Low Copper Content. **Mosiądze niskomiedziowe.** (Polish.) Czesław Adamski. *Przeglad Odlewnictwa*, v. 4, no. 5, May 1954, p. 123-132; no. 6, June 1954, p. 157-162.

Effect of Fe, Mn, Si, and other alloying elements on mechanical properties and corrosion resistance; applications. Micrographs, tables, photographs, graphs. 22 ref.

12901* Rem-Cru A-110AT. *Rem-Cru Titanium Data Sheet*, 1955, June 1, 8 p.

Alloy design, applications, forms available, physical and mechanical properties, corrosion resistance, fabricating, heat treating, and welding. Tables, graphs.

12902* Alloys of the Platinum Metals. General Outline of Work in Recent Years. **Alliages des métaux de la famille du platine. Résumé des travaux des dernières années.** (French.) Ernst Raub. *Revue de métallurgie*, v. 52, no. 6, June 1955, p. 429-439; disc., p. 439-440.

Review includes problems relating to: equilibrium diagrams of the Pd-Mn, Pd-Cr, and Pt-Mn systems, and of the Au-Pt-Pd and Pd-Cu, with Au or Ag, alloys; combinations of the six Pt metals with metals of the third, up to the sixth, group of the periodic system; and classified phases and changes of properties due to their appearance in the alloys with Mn, Cr, and Co. Graphs, tables, diagrams. 28 ref.

12903* Platinum Metals in Electrical Engineering, Dentistry, and the Jewelry Industry. **Rôle des métaux de la famille du platine dans l'industrie électrique, la technique dentaire et la bijouterie.** (French.) K. Ruthardt. *Revue de métallurgie*, v. 52, no. 6, June 1955, p. 441-446.

Importance of Pt, Pd, and Rh in the pure and alloyed state. Photographs, tables.

12904* Properties and Weldability of Nonmagnetizable Steels. **Über die Eigenschaften und die Schweissbarkeit unmagnetisierbarer Stähle.** (German.) Franz Rapatz and Alfred Schmidt. *Schweisstechnik*, v. 9, no. 5, May 1955, p. 49-55.

Composition, strength and electrical properties, and field of application of non-magnetizable steels. Method and optimum conditions of welding. Tables, diagrams, photographs.

12905* Development and Today's Status of the Weldable Structural Steel St. 52. **Die Entwicklung und der heutige Stand des schweissbaren St. 52.** (German.) E. Folkhard. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 21, no. 6, June 1955, p. 183-198.

Composition of St. 52 steel in Germany, France, Belgium, Austria, England, and the United States; mechanical properties; selection of welding electrodes; heat treatment. Tables, graphs, micrographs, photographs, diagrams. 14 ref.

12906 Standards for Sheet, Strip and Plate in Aluminium and Its Alloys. H. M. Bigford and E. Elliott. *Sheet Metal Industries*, v. 32, no. 339, July 1955, p. 491-494; disc., p. 494-496.

Discussion of efficacy of British standards; variations of properties within standard limits and their effects of manufactured products. Table.

12907 A Simple Treatment for the Reclamation of Tin From Soldered Metal Scrap. W. M. Halliday. *Sheet Metal Industries*, v. 32, no. 339, July 1955, p. 505-506, 508.

Equipment and methods for a lead-wash recovery process.

12908 Lighter Autos Down the Road. Leo Swoboda. *Steel*, v. 137, July 18, 1955, p. 106-107.

Use of Al in brake drums, trim, radiators, flywheel housings, doors, and many other parts. Photograph.

12909 Out of a Vacuum—Tougher Metals. *Steel*, v. 137, July 25, 1955, p. 88-90.

Description and operation of 1000-lb. vacuum melting furnace. Process provides big boost for stress-rupture life. Photographs, graphs.

12910 Vacuum Steel: Boost to Bearings. Leland D. Cobb. *Steel*, v. 137, Aug. 15, 1955, p. 136-137.

Elimination of inclusions in ball bearing tool steels by the use of vacuum melting. Micrographs, photograph.

12911* Use of Radioactive Isotopes in Metallurgy. **Anvendelse av radioaktive isotoper i metallurgien.** (Norwegian.) Ulf Been. *Tidsskrift for Kjemi, Bergvesen og Metallurgi*, v. 15, no. 6, 1955, p. 104-106.

Radioactive isotopes as aids in the study of diffusion vapor pressure, micro-structure, friction, wear, lubrication, and various problems of process metallurgy and radiography.

12912* State of Standardization in Metallurgy. Standards of Non-Ferrous Metals. **Stan normalizacji w hutnictwie. Normy metali nieżelaznych.** (Polish.) Marian Sadłowski. *Wiadomości Hutnicze*, v. 11, no. 6, June 1955, p. 170-173.

Comparison of standards for pressed, rolled, drawn, extruded non-ferrous sheets, rods, pipes, etc., for refractory materials, and for methods of investigation. Table.

12913* Most Recent Developments in Mg. **Neueste Entwicklungen auf dem Gebiet des Magnesiums.** (German.) Charles E. Nelson. *Zeitschrift für Metallkunde*, v. 46, no. 5, May 1955, p. 338-349.

Production and properties of Mg and its alloys; methods of melting, casting, alloying, processing, and welding; uses in industry. Flowsheet, tables, graphs, micrographs, photographs, diagram. 8 ref.

12914* Bimetals. **Bimetalle.** (German.) Walter Rienäcker. *Zeitschrift für Metallkunde*, v. 46, no. 6, June 1955, p. 429-434.

Contact and thermo bimetals; alloys utilized; elongation behavior; properties of industrial thermo bimetals. Table, graphs, diagram. 5 ref.

Metallurgy

12915* Amalgam as an Auxiliary Medium in Metallurgical Research. **Die Amalgame als Hilfsmittel in der metallkundlichen Forschung.** (German.) Franz Lihl. *Zeitschrift für Metallkunde*, v. 46, no. 6, June 1955, p. 434-441.

Low temperature formation of alloys by the reduction and amalgam methods. Preparation of binary, ternary, and quaternary alloys by amalgamation process; limits of the field of application. Graphs, phase diagrams. 21 ref.

12916* Alloys of Indium. **Die Legierungen des Indiums.** (German.) Siegfried Valentiner. *Zeitschrift für Metallkunde*, v. 46, no. 6, June 1955, p. 442-449.

Critical survey of metallurgical research on In alloys, particularly from the point of view of the position of In in the periodic system. Tables, phase diagrams. 86 ref.

Books and Miscellaneous Publications

12917 American Society for Metals, Transactions. Ray T. Bayless and G. G. Fitzgerald, editors. v. XLVII. 1051 p. 1955. American Society for Metals, Cleveland. (TS300 Am35t)

Forty eight papers most of which were presented at the Thirty-Sixth Annual Convention of the Society, held in Chicago, Nov. 1-5, 1954.

12918 Theoretical Structural Metallurgy. A. H. Cottrell. 2nd Ed. 251 p. 1955. St. Martin's Press, New York. (QD171 C82t2)

Atomic structure; theory of crystals; equilibrium states; diffusion; transformations; shear processes.

12919 General Metallurgy. **Metalurgia General.** (Spanish.) Emilio Jimeno and F. R. Morral. 1324 p. 1955. University of Madrid, Madrid. (TN665 J56m)

A comprehensive treatment of physical and extractive metallurgy; ore dressing; properties; alloying; powder metallurgy; welding; corrosion; structures.

12920 Metals Reference Book. Colin J. Smithells. v. I-II. 2nd Ed. 967 p. 1955. Interscience Publishers, New York. (TA459 Sm68m2)

A convenient summary of data relating to metallurgy and metal physics, presented as far as possible, in the form of tables or diagrams with a minimum of descriptive material. Where information could not otherwise be adequately presented, short monographs are included.

12921 The Metal Beryllium. D. W. White, Jr. and J. E. Burke, editors. 703 p. 1955. American Society for Metals, Cleveland.

Primary concern of the book is the metal beryllium, but certain Be-rich compounds are also covered. Use of Be as an alloying element, as well as its use in at. energy are discussed. Papers are individually abstracted.

METALS—EXTRACTION AND REFINING

12922 The Role of Slag Composition in Open Hearth Desulphurization and Oxidation. H. L. Bishop, T. B. King, and N. J. Grant. *American Iron and Steel Institute, Preprint*, 1955, 18 p. (TS300 Am35y)

Considers the oxidizing power of the slag and the partition of S between slag and metal as these are related to slag composition. Graphs, phase diagram. 12 ref.

12923* The Process of Zinc Rectification. **Process rektyfikacji cynku.** (Polish.) Aleksander Krupkowski and Henryk Fik. *Archiwum Górnictwa i Hutnictwa*, v. 2, no. 3, 1954, p. 243-352.

Discusses the balances necessary to estimate the elements of working intensity of the rectification furnace and, especially, for the evaporation chambers, first stage condensation chambers and condensors. Tables, graphs, diagrams. 17 ref.

12924 Pneumatic Steelmaking Processes. II. D. J. Carney. *Blast Furnace and Steel Plant*, v. 43, July 1955, p. 753-760.

Discussion of the use of O in acid bottom blown Bessemers and the processes, requirements, control, and reactions of the basic Bessemer. Tables, graphs. 11 ref. (To be continued.)

12925 The Use of Sintered Pyrrhotite Resides In the Production of Low Phosphorus Pig Iron. L. A. Miller. *Blast Furnace and Steel Plant*, v. 43, July 1955, p. 761-764, 794-795.

Operation of the furnace with a burden of 88% copper-hill sinter and 12% brown ore. Description of the furnace, and low and high blast heat practice. Tables, diagrams, graph.

12926 Study of the Deoxidation of Steel by Vacuum Melting. J. Thomas and L. Moreau. *Henry Brutcher Translation No.* 3350, 10 p. (From *Revue de Métallurgie*, v. 43, nos. 7-8, 1946, p. 204-207.) Henry Brutcher, Altadena, Calif.

Effect of reduced pressure upon deoxidation of steel with C; underlying equilibrium considerations. Possibilities of deoxidizing steel in ladle (or converter-shaped vessel) by holding it under vacuum for a short period of time. Tables, graphs. 1 ref.

12927 Investigation of the Oxidizing Zone in a Blast Furnace Working on Blast of Normal and of Increased Moisture Content. N. N. Chernov. *Henry Brutcher Translation No.* 3449, 15 p. (Abridged from *Izvestiya Akademii Nauk SSSR, OTN*, 1954, no. 7, p. 105-115.) Henry Brutcher, Altadena, Calif.

Review of previous work on the extent of the oxidizing zone; conflicting U. S. and Russian opinions regarding the effect of water enrichment of the blast, and size of the oxidizing zone; several possible explanations of effect of increased moisture content of blast. Graphs, diagrams. 15 ref.

12928 Processes Occurring in the Bosh of the Blast Furnace. I. P. Bardin and M. Ya. Ostroukhov. *Henry Brutcher Translation No.* 3525, 12 p. (Abridged from *Izvestiya Akademii Nauk SSSR, OTN*, 1954, no. 3, Mar., p. 72-81.) Henry Brutcher, Altadena, Calif.

Importance of state of materials in this zone for the permeability of the stock column; investigational procedure and sampling technique. Tables, graphs, micrographs. 2 ref.

12929* Obtaining Boron by Igneous Electrolysis. **Sur l'obtention du bore par électrolyse ignée.** (French.) J.-L. Andrieux and W. J. Deiss. *Bulletin de la société chimique de France*, 1955, no. 6, June p. 838-841.

Experimental study of 29 electrolytic baths of various composition for obtaining B. Tables. 9 ref.

12930* **Refining at Fort Saskatchewan.** Sydney Nashner. *Canadian Mining and Metallurgical Bulletin*, v. 48, no. 519, July 1955, p. 396-410; *Canadian Institute of Mining and Metallurgy, Transactions*, v. 58, 1955, p. 212-226.

Pressure leaching-reduction process for Ni-Cu concentrates. Flowsheet, diagrams, photographs, tables. 6 ref.

12931* Japanese Tests on the Injection of Oxygen-Enriched Blast and Powdery Materials Into the Crucible of a Small, Experimental Blast Furnace. **Essais, au Japon, d'injection d'air suroxygéné et de matières pulvérulentes dans le creuset d'un petit haut fourneau expérimental.** (French.) *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques*, v. 12, no. 6, 1955, p. 1061-1086.

Injection permits control of cast iron composition and of crucible temperature, and rapid re-establishment of normal operating conditions. Tables, diagrams, graphs.

12932* Inquiry on the Shutting Down of Converters for Repairing Lining or Changing the Bottom. **Enquête sur l'arrêt des convertisseurs pour réfection du vêtement ou changement du fond.** (French.) Lanquetin. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques*, v. 12, no. 6, 1955, p. 1215-1226.

Presents tabulation of various steps and precautions in the operations. Tables.

12933* Contribution to the Study of the Role of Mn in Refining in the Thomas Converter. **Contribution à l'étude du rôle du manganèse dans l'affinage au convertisseur Thomas.** (French.) P. Leroy. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques*, v. 12, no. 6, 1955, p. 1227-1233.

Investigates influence of Mn content of cast irons on quality of steel produced. Graphs.

12934 Variations and Modifications of Kroll Process for Production of Zirconium Metal. H. L. Gilbert and C. Q. Morrison. *Chemical Engineering Progress*, v. 51, July 1955, p. 320-325.

Development of ways to streamline production methods making the existing furnaces and facilities more effective without additional expenditure for primary equipment. Studies of reduction reactions, zirconium-chloride purification, and $MgCl_2$ removal. Photographs, graph, diagrams. 6 ref.

12935* Preparation of Ge by Fused Electrolysis. **Préparation du germanium par électrolyse ignée.** (French.) Jean-Lucien Andrieux and Marie-Jeanne Barbier-Andrieux. *Comptes rendus*, v. 240, no. 22, June 1, 1955, p. 2104-2106.

Preparation of Ge by electrolysis of GeO_2 dissolved in borates or alkaline silicates of by electrolysis of fused alkaline germanates. Tables. 4 ref.

12936* Influence of the Purity and the Structure of the Metal on the Solubility of O in Fe. **Influence de la pureté et de la structure du métal sur la solubilité de l'oxygène dans le fer.** (French.) Raymond Sifferlen. *Comptes rendus*, v. 240, no. 26, June 27, 1955, p. 2526-2528.

Study made on specimens of cold-worked, high-purity Fe at different annealing times and temperatures. Tables. 5 ref.

12937* Foundry Practice. IX. The Molten Metal. William H. Salmon and Eric N. Simons. *Edgar Allen News*, v. 34, July 1955, p. 161-162.

Preparation of steel in the bessemer converter and electric arc furnace. Special procedures for production of steel for casting. Graphs, tables. (To be continued.)

12938 Bomb Reduction of Molybdenum Trioxide by Calcium Metal. H. L. Gilbert and F. E. Block. *Electrochemical Society, Journal*, v. 102, July 1955, p. 394-398.

Description of the production of 25-lb. reguli; joining of reguli as a consumable electrode in arc melting to produce ingot; hot forging and rolling to desired form. Photographs, diagrams, micrographs, table. 9 ref.

12939 Life of Ingot Moulds: Conditions of Service, Mould Material and Design, and Metal Composition. *Foundry Trade Journal*, v. 99, July 28, 1955, p. 101-102.

Results and conclusions of extensive studies of mold performance with the aim towards reducing their consumption. Graph, table.

12940* Experimental Comparison of Properties of Carbon Steel Made in Acid and in Basic Lined Open-Hearth Furnace. **Experimentální porovnání vlastností uhlíkové oceli vyrobené v kysele a zásaditě vyzděných Siemens-Martinových pecích.** (Czech.) Zdeněk Eminger and František Kinský. *Hutnické Listy*, v. 10, no. 6, June 1955, p. 329-345.

Compares mechanical physical, physico-chemical, and technological properties. Cast and forged C-V steels, for the production of large crank shafts, are produced especially for this study. Tables, graphs, diagrams, photographs, micrographs. 8 ref.

12941* On the Bessemerizing Process in the Hearth of Blast Furnace. (Japanese.) Kuro Kanamori. *Institute of Industrial Science, Report, (University of Tokyo)*, v. 4, no. 4, Mar. 1955, 64 p.

Production of pig iron with low S (0.01%); activation of Ni and Cr in the furnace bath. Graphs, diagrams, tables.

12942 Oxygen Improves Competitive Position of Older Openhearth. G. C. Lawton. *Iron Age*, v. 176, July 14, 1955, p. 112-113.

Much improved fuel input, greater flexibility in scrap used, faster meltdown, few long soaking periods are some of the advantages gained. Photograph.

12943 Brazilian Charcoal Blast Furnace Practice. R. G. Walker. *Iron & Steel*, v. 28, June 1955, p. 297-300.

Improving operations; comparison with other processes; low shaft blast furnaces; the development of charcoal blast furnaces. Table, diagrams.

12944 Vacuum Furnaces Will Make Better Steels. *Iron and Steel Engineer*, v. 32, July 1955, p. 136, 139-140.

Design features, application, production, control, and operation of the furnace; production and application of specialized vacuum melted alloys. Diagram, photographs.

12945* A Special Type of Ingot Cracks Caused by Certain Impurities. **Ett särskilt slag av götsprickor, förorsakat av vissa föroreningar.** (Swedish.) Paul Björnson and Helmer Nathorst. *Jernkontorets Annaler*, v. 139, no. 6, 1955, p. 412-438.

Special type of ingot cracks are found when steel contains Cu and Sn, which segregate to the primary grain boundaries on cooling, forming precipitate of probably liquid Cu-Sn phase. The mechanism of crack formation is discussed. Tables, micrographs, diagrams. 12 ref.

12946 Ore Fines Utilized in Low Shaft Furnace to Produce Thomas Pig Iron. P. Coheur. *Journal of Metals*, v. 7, Aug. 1955, p. 872-876.

Pilot plant studies for production of low-Si pig iron from raw materials which cannot be used in conventional blast furnaces because of fineness or other reasons. Tables, graphs, diagram. 5 ref.

12947 Slag Fuming Furnaces Recover Zinc and Lead From Copper Slag. R. E. Mast and G. H. Kent. *Journal of Metals*, v. 7, Aug. 1955, p. 877-884.

Equipment and procedures for use with reverberatory furnace slag. Photographs, graphs, tables, diagram, flowsheet.

12948 Thermodynamic Considerations in the Preparation of Bryllium Metal. H. H. Kellogg. Paper from THE METAL BERYLLIUM. p. 49-62. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Thermodynamic data; sources of data; reduction by calcium metal; halide, thermal, and electrolytic reduction; refining by distillation. Tables, graphs. 18 ref.

12949 The Fluoride Extraction of Beryllium From Beryl. Henry C. Kawecki. Paper from THE METAL BERYLLIUM. p. 63-70. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Basic chemistry, commercial practice, product uses, and production of Be fluoride are discussed. Diagram. 20 ref.

12950 The Sulphate Extraction of Beryllium From Beryl. C. W. Schwenzfeier, Jr. Paper from THE METAL BERYLLIUM. p. 71-101. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Production of $Be(OH)_2$ and BeO, and BeF_2; thermochemical reduction to Be metal; purification and consolidation of Be pebbles by vacuum melting and casting. Diagrams, photographs, table. 6 ref.

12951 The Production of Beryllium by the Electrolysis of Beryllium Chloride. C. E. Windecker. Paper from THE METAL BERYLLIUM. p. 102-123. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Discussion of the preparation of unrefined $BeCl_2$ and the subsequent purification by electrolysis. Diagrams, graphs, photograph. 7 ref.

12952 Experimental Reductions of Beryllium. T. T. Magel. Paper from THE METAL BERYLLIUM. p. 124-135. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Reduction of Be halides with alkali and alkaline earth metals; reduction of BeO; electrolytic reduction and other reduction experiments. Diagrams. 36 ref.

12953 Titanium. W. J. Kroll. *Metal Industry*, v. 87, July 22, 1955, p. 63-66; July 29, 1955, p. 83-86.

History, ores, and refining of Ti. Fluoride reduction, iodide dissociation process, fusion electrolysis, and soluble anode processes are discussed. Diagram, photographs. 53 ref. (To be continued.)

12954* Let's Make Basic Steel. John P. Holt. *Modern Castings and American Foundryman*, v. 28, Aug. 1955, p. 33-37.

Problems involved and reasons for changing from acid to basic steelmaking. Photographs, table. 7 ref.

Metals—Extraction and Refining

12955* Mechanism of the Cyanidation Method in the Metallurgy of Gold. **Über den Mechanismus des Cyanidverfahrens in der Metallurgie des Goldes.** (German.) E. Abel. *Monatshefte für Chemie*, v. 86, no. 3, 1955, p. 536-539.

A new interpretation of the mechanism based on autoxidation. 17 ref.

12956* Desulfurization of Blast Furnace Pig Iron. **Odsiarczanie surówki wielkopiecowej.** (Polish.) A. Ofiok. *Prace Instytutów Ministerstwa Hutnictwa*, v. 7, nos. 2-4, 1955, p. 106-114.

Use of soda, lime, salt, or sodium hydroxide, outside the furnace, and an evaluation of their relative effectiveness. Tables, graphs, diagrams. 25 ref.

12957* Research on the Use of Magnesium Ferro-Silicon Alloys and "Electron" Alloy Scrap for the Production of Cupola Nodular Iron. **Badania nad zastosowaniem stopów magnezu z żelazokrzemem i złomu elektronowego do produkcji żeliwa sferoidalnego z żeliwiaka.** (Polish.) Jerzy Piaskowski. *Przeglad Odlewnictwa*, v. 4, no. 5, May 1954, p. 132-138.

Experiments Mg Si show that their Cu and Al content have little effect on the strength properties of the Fe; improved results attained with lower Mg content and through normalizing. Micrographs, tables.

12958* Influence of Temperature During Refining on the Nitrogen Content of Basic Bessemer Steel. **Influence de l'évolution de la température en cours d'affinage sur la teneur en azote de l'acier Thomas.** (French.) B. Trentini, P. Leroy, and M. Gombert. *Revue de métallurgie*, v. 52, no. 5, May 1955, p. 418-427.

The utilization of a two-color pyrometer, at the bottom of a 19-ton converter, and direct recording of the refining permits a comparison of temperature curves corresponding to various additions, and facilitates a study of the effect of cooling additions charged during refining. Graphs, tables. 15 ref.

12959* The Extraction and Refining of the Pt Metals From Their Sulphide Ores. **L'affinage des concentrés de métaux de la famille du platine provenant de minerais sulfurés.** (French.) A. R. Raper and F. S. Clements. *Revue de métallurgie*, v. 52, no. 6, June 1955, p. 447-456.

Recovery of precious metals from the concentrates of anodic slimes, resulting from the electrolytic refining of Cu and Ni, by complex chemical processes. Table, diagrams. 25 ref.

12960* Desulfurization by Stirring With Slags. **Désulfuration par brassage avec laitiers.** (French.) René Perrin. *Revue de métallurgie*, v. 52, no. 6, June 1955, p. 473-476.

General principles of the steel desulfurization processes, especially the stirrings with melted slags, and also the fundamentals of a new method of simultaneous desiliconization and desulfurization of steel, using a single slag of appropriate composition.

12961* The Oxidation Period in Basic Electric Arc-Furnaces. **Oxydační údobí v zásaditè obloukové peci.** (Czech.) Přemysl Fremunt and Pavel Plant. *Slévárenstvi*, v. 3, no. 7, July 1955, p. 202-207.

Methods of lowering the P content in the steel by regulating of the charge temperature of the slag composition. Effect of various methods of predeoxidising steel on the no. of nonmetallic inclusions. Tables, graphs. 7 ref.

12962* **Recent Progress in the Design and Operation of Gold Reduction Plants.** H. Britten. *South African Mining and Engineering Journal*, v. 66, pt. 1, July 9, 1955, p. 779 + 4 pages.

Sorting and crushing; sorting and disposal of wastes; ore storage; milling; concentration; recording instruments; product testing. 5 ref.

12963* The Relations Between Blast Furnace Operation and Pig Iron Quality and Their Effect on the Quality of the Basic Converter Steel. **Die Beziehungen zwischen Hochofenführung und Roheisenbeschaffenheit und deren Einfluss auf die Güte des Thomasstahles.** (German.) Walter Hummel, Walter Loorz, and Willy Oelsen. *Stahl und Eisen*, v. 75, no. 14, July 14, 1955, p. 885-900.

Observations made when tapping; effects of the flow of gases and the burdening conditions on the characteristic data; degree of the pig iron reduction and quality of the basic converter steel. Diagrams, graphs, tables. 13 ref.

12964* Measures to Be Taken for Improving the Life of Slag Ladles. **Massnahmen zur Verbesserung der Haltbarkeir von Schlackenpfannen.** (German.) Eugen Betting. *Stahl und Eisen*, v. 75, no. 14, July 14, 1955, p. 906-911.

Relations between the stresses sustained by the ladle material, effect of heat, structural design of parts, and impact loads in operation. Conclusions for the design of the ladle support, of the ladle wall, and for the choice of the material. Table, diagrams, graphs, photographs. 1 ref.

12965 Preliminary Electric Smelting Research on Philippine Nickelferous Ores. L. H. Banning and W. E. Anable. *U. S. Bureau of Mines, Report of Investigations* 5129, May 1955, 13 p. (TN21 Un3r)

Feasibility studies on production of ferronickel using laterite ores and bagasse. Tables, photographs.

12966 Melting, Refining, and Granulation of Cobalt Powder. J. D. Marchant, L. H. Banning, and W. F. Hergert. *U. S. Bureau of Mines, Report of Investigations* 5133, May 1955, 14 p. (TN21 Un3r)

Removal of P and S from a Co-Ni concentrate. Production of granules suitable for stockpiling. Photographs, tables.

12967* Utilization of Vacuum in Metallurgy. **Utilisation du vide en métallurgie.** (French.) J. A. Stohr. *Vide*, v. 10, no. 57, May-June 1955, p. 64-70.

Methods; equipment; fields of application; advantages and disadvantages. Table, diagram, graphs, photographs.

12968* Reduction of Zinc Oxide With Carbon Monoxide and Hydrogen. **Über die Reduktion des Zinkoxyds mit kohlenmonoxyd und Wasserstoff.** (German.) J. Gerlach and O. Knacke. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 8, no. 6, June 1955, p. 275-278.

Equilibrium diagram of muffle reaction; experimental determination of reaction rate of ZnO with Co and H; function of gas concentration. Table, graphs, diagrams. 1 ref.

12969* Processing Fine Grain Brass Scrap by Means of Smelting and by Powder Metallurgy. **Über die feuerflüssige und sintermetallurgische Verarbeitung feinkörniger Messingabfälle.** (German.) Erich Fetz. *Zeitschrift für Metallkunde*, v. 46, no. 6, June 1955, p. 415-429.

Influence of size, type, and composition of scrap on processing method; fluxes, additions, and grain size. Advantages and disadvantages of applying powder metallurgy. Tables, graphs. 48 ref.

See also:

12807 (temperature measurement in open-hearths)

METALS—FINISHING, POLISHING, AND CLEANING

12970* **Developments in Preparatory Treatments. II. Chemical: Cleaning and Pickling.** *Corrosion Prevention and Control*, v. 2, July 1955, p. 41-43.

Cleaning and conditioning cycles before electroplating Cu, Mg, Mo, steel, Ti, or Zn. 15 ref.

12971 Gas Furnaces Used for Aluminum Coating Process. Arthur Q. Smith. *Industrial Heating*, v. 22, July 1955, p. 1380 + 5 pages.

Furnaces for processing; equipment for preparing metal surfaces; advantages of the processes. Photographs.

12972 Alkaline Solutions: What to Use for Effective Cleaning. J. B. Mohler. *Iron Age*, v. 176, July 28, 1955, p. 59-62.

Parts may be cleaned in alkaline solutions, electrolytically, by means of a steam gun, soaking, spraying, tumbling, or scrubbing. In most cases, alkaline cleaning consists of four steps—clean, rinse, hot rinse, and dry—but the procedure may vary with the base metal and contaminant present. Four chemicals—sodium hydroxide, sodium metasilicate, trisodium phosphate, and sodium carbonate—plus a wetting agent, will do most metal cleaning jobs. Tables, graphs.

12973* Developments in the Field of Chemical Polishing of Aluminum. **Entwicklungen auf dem Gebiet des chemischen Glänzens von Aluminium.** (German.) R. Lattey and H. Neunzig. *Metalloberfläche*, Ausgabe A, v. 9, no. 7, July 1955, p. 97-103.

Tehory of chemical polishing. "Alupol" and "Erftwerk" polishing methods. Optimum conditions. Advantages. Tables, graphs, micrographs. 11 ref.

12974 Cleaning With Ultrasonics. Frank W. Hightower. *Metal Progress*, v. 68, July 1955, p. 99-104.

Use of ultrasonic cleaning where the surfaces to be cleaned are not readily accessible or when they must be scrupulously clean, as in plating or adhesive bonding. Photographs, graphs.

12975 Sodium Hydride Descaling of Titanium. W. J. Barth and A. L. Field, Jr. *Metal Progress*, v. 68, Aug. 1, 1955, p. 114-116.

When Na H is used to descale Ti, H will be absorbed by the metal as soon as the scale is entirely removed. To minimize H absorption, the descaling cycles should always be held to the shortest time required for scale removal. Tables, graphs.

12976* Cleaning and Finishing Practice for Phosphated Zinc-Coated Sheets. W. E. McFee. *Organic Finishing*, v. 16, July 1955, p. 11, 13.

Types of cleaners used, methods of cleaning, type of coating to use, and methods of applications for best results. Photographs.

12977* Finishing Ductile Iron. John Starr. *Organic Finishing*, v. 16, July 1955, p. 12-13.

Discussion of factors to be taken into consideration when finishing the castings with organic coating materials. Photographs.

12978* Steel Pickling in Acid Solutions. **Wytrawianie stali w roztworach kwasów.** (Polish.) J. Foryst. *Prace Instytutów Ministerstwa Hutnictwa*, v. 7, nos. 2-4, 1955, p. 152-156.

Determination of effective pickling inhibitors, for C and low alloy steels, and their effects on brittleness. Difficulties arising from pickling high-Si Fe sheets are attributed to structure and chemical composition of the scale formed during annealing. Graphs, micrographs, diagram. 7 ref.

12979 Finishes for Metals. Processes and Equipment. Robert A. Wason. *Tool Engineer*, v. 35, Aug. 1955, p. 111-120.

Reviews methods and equipment for cleaning and painting. Photographs, diagrams.

METALS—FOUNDRY PRACTICE

12980 The Hot-Blast Cupola in the Steel Plant. Th. Kootz and H. Rellermeyer. *Henry Brutcher Translation No.* 3513, 16 p. (Abridged from *Archiv für das Eisenhuttenwesen*, v. 26, no. 1. 1955, p. 1-8.) Henry Brutcher, Altadena, Calif.

Use of cupola iron as hot metal for the open-hearth furnace to boost production; investigational set-up, procedure, and comments on operational technique. Tables, graphs, diagrams. 10 ref.

12981 Economical Production of Foundry Molds by the Carbon-Dioxide Process. W. Saubermann. *Henry Brutcher Translation No.* 3528, 8 p. (Abridged from *Giesserei-Praxis*, v. 73, no. 7, 1955, p. 130-132.) Henry Brutcher, Altadena, Calif.

Proposed highly mechanized mold-making process and machine; possibility of working the CO_2 process into fully mechanized foundry practice. Principles of mold-making machine; extension of its scope by fitting different blowing or ramming heads.

12982 On the Application of the Carbon Dioxide Process (by Schmidt and Philipp) in Light-Metal Foundries. *Henry Brutcher Translation No.* 3529, 5 p. (From *Giesserei-Praxis*, v. 72, no. 7, 1954, p. 117-118.) Henry Brutcher, Altadena, Calif.

Practical application of the CO_2 process for Al and Mg castings; time saving factors in making different types of cores and molds of extremely complicated shape.

12983* On Various Theories of Globular Graphite Formation in Cast Iron. Ichiro Iitaka. *Castings Research Laboratory, Reports, Waseda University*, 1955, no. 6, p. 1-5.

Critical review and comparison of surface tension, supersaturation, and other theories. Diagrams. 22 ref.

12984 Long-Length and Bi-Metal Centrifugal Castings. *Engineering*, v. 180, July 22, 1955, p. 112-113.

Controlled coatings on metal molds, mold preparation, and casting and stripping methods are discussed. Photographs.

12985* Production of Cast Iron With Nodular Graphite. **Ghisa per la produzione di ghisa a grafite sferoidale.** (Italian.) R. Zoia and A. Masi. *Fonderia*, v. 4, no. 5, May 1955, p. 215-219.

Production and composition of nodular-graphite cast iron. Table, graph, micrographs. 12 ref.

12986* Functional Curve of a Cupola Furnace. **La curva funzionale del cubilotto.** (Italian.) J. N. Alcacer and J. A. J. de Andrés. *Fonderia*, v. 4, no. 6, June 1955, p. 249-253.

Theory of operation. Diagrams, tables, graphs. 4 ref.

12987 Brass Foundry Modernization Raises Plant Efficiency. Edwin A. Swensson and James F. Gallagher. *Foundry*, v. 83, Aug. 1955, p. 86-89.

Through mechanization a foundry meets demands for lower cost castings and higher production rates. Photographs, tables.

12988 New Centrifugal Process Uses Sand-Resin Lining. Edwin Bremer. *Foundry*, v. 83, Aug. 1955, p. 90-93.

Description of a process which combines the advantages of the steel mold and metal flask with rammed sand lining methods of casting. Photographs.

12989 The Brass Foundry. Harry St. John. *Foundry*, v. 83, Aug. 1955, p. 94-97.

Details of how casting costs can be cut and quality improved through the possibilities inherent in these four elements: men, machines, metal, and sand. Photographs.

12990 Mechanizing a Small Foundry. William G. Gude. *Foundry*, v. 83, Aug. 1955, p. 98-100.

Description of a small modern foundry with a high degree of mechanization in all phases of the work. Photographs, diagram.

12991 Huge Castings Required for Heavy Forging Presses. *Foundry*, v. 83, Aug. 1955, p. 101-103.

Production of large castings used in the construction of heavy forging presses. Photographs.

12992 So You Are Going to Try Shell Molding. John G. Steinebach. *Foundry*, v. 83, Aug. 1955, p. 104-107.

Practical advice and operational hints for foundries which are contemplating installation of shell molding operation. Photographs.

12993 A New Role for Pattern Shops. Al Brocklebank and William J. Sikula. *Foundry*, v. 83, Aug. 1955, p. 108-109.

Role of patternmaker as a design consultant on foundry techniques and as a go-between from the designer and the foundry. Diagrams, photographs.

Metals—Foundry Practice

12994 Making Precision Castings in Glass Molds. *Foundry*, v. 83, Aug. 1955, p. 140, 142-143.

Results of tests using this method for the production of jet engine buckets and vanes show that 90% of the castings met precision standards on surface finish. Photographs.

12995 Influence of Grain Size on Structure, Pressure-Tightness and Tensile Properties of Sand-Cast Bronzes and Gunmetals. A. Cibula. *Foundry Trade Journal*, v. 98, June 30, 1955, p. 713-726.

It is concluded that the mode of solidification varies considerably with pouring conditions. Solidification in alloys cast at high temperatures, without a grain refiner, proceeds largely by skin-growth; with grain refiners or casting at low temperature, equiaxial grains are nucleated throughout and "pasty" solidification occurs. Diagrams, graphs, micrographs, tables, photographs. 26 ref.

12996 Metal and Mould Research on Steel Castings. I. Solidification Mechanism. II. Mould- and Core-Bonding Agents. J. A. Reynolds, A. Preece, J. M. Middleton, and J. White. *Foundry Trade Journal*, v. 99, July 14, 1955, p. 31-38; July 21, 1955, p. 59-70, 82.

Relation between factors governing mode of freezing of molten metal, of subsequent cooling, and resultant structure, which may influence final physical properties of the cast material; constitution, properties, and mineral classification of bonding clays; influence of molding materials on incidence of hot-tearing.

12997 Evaluation of Casting Processes. Hiram Brown. *Foundry Trade Journal*, v. 99, July 28, 1955, p. 85-92.

Superiority of castings for many applications, and the advantages and limitations of various foundry methods. Photographs. 4 ref.

12998 Costing of Gravity-Die-Castings: Approach to the Problem in a Small Non-Ferrous Foundry. G. R. Cowley. *Foundry Trade Journal*, v. 99, July 28, 1955, p. 95-98.

Indicates how job costing can be developed into standard costing and hence into budgetary control. Although specifically prepared in relation to die-casting, much of the precept and practice equally well applies to sand founding.

12999* Characteristic Properties of Alloys for Pressure Casting. **Kennzeichnende Eigenschaften von Druckgusslegierungen.** (German.) Gustav Lieby. *Giesserei*, v. 42, no. 14, July 7, 1955, p. 357-361.

Solidification of alloys in pressure casting; basic properties of alloy used; physical and mechanical properties of finished product. Photograph, graphs, tables, diagrams, micrographs. 1 ref.

13000* Smelting and Heat Crackability of Hard Manganese Cast Steel. **Zur Erschmelzung und Warmrissigkeit von Manganhartstahlguss.** (German.) Friedrich-Carl Althof. *Giesserei*, v. 42, no. 14, July 7, 1955, p. 362-370.

Melting procedure; influence of composition of mold material on hot cracking; mechanism of crack formation and method of prevention. Photographs, micrographs, tables, graphs, diagrams. 29 ref.

13001* The Metallurgy of a High-Test Cast Iron With Compact to Spherical Graphite Structure. **Zur Metallurgie eines hochwertigen Gusseisens mit kompakter bis kugelförmiger Graphitausbildung.** (German.) Eugen Piwowarsky and Ernst-Günter Nickel. *Giesserei*, v. 42, no. 15, July 21, 1955, p. 385-392.

Production of high-strength cast iron by superheating; methods of deoxidizing, degassing, and melting in basic-lined furnaces. Tables, micrographs, diagram, graph. 8 ref.

13002* Mold Reaction in Non-Ferrous Metal Castings. **Formreaktionen vid gjutning av tung-och lättmetaller.** (Swedish.) W. A. Baker. *Gjuteriet*, v. 45, no. 6, June 1955, p. 75-81.

Gas absorption in non-ferrous casting alloys; reaction mechanisms; effects of gas absorption by mold reaction on the properties of castings. Tables, diagrams, photographs, graphs. 8 ref.

13003 Institute of British Foundrymen, Proceedings. (Annual Volume), v. 47, 1954, 396 p. Institute of British Foundrymen, Manchester 3, England. (TS200 In 7p)

Consists of 30 papers presented to the Fifty-first Annual General Meeting of the Institute and a selection of the papers presented to the Branch Meetings held during the Session, 1953-54. Most papers have been previously abstracted as preprints or as published in *Foundry Trade Journal*. The remaining papers are abstracted separately.

13004 Some Aspects of Shell-Moulding Technique. D. F. Bailey. *Institute of British Foundrymen, Proceedings*, v. 47, 1954, p. 250A-256A. (TS200 In7p)

Shell-making materials, mixtures, and methods; causes and remedies for mold failures. Table, graphs, photographs.

13005 Quantity Production of Engineering Castings. J. Burrell. *Institute of British Foundrymen, Proceedings*, v. 47, 1954, p. 1B-14B. (TS200 In7p)

Changes in plant layout and production methods necessitated by increase in nature of production from jobbing to mass production of tractor parts.

13006 Operating Experiences With Hot-Blast Cupolas in Great Britain. F. C. Evans. *Institute of British Foundrymen, Proceedings*, v. 47, 1954, p. 56B-65B; disc., p. 65B. (TS200 In7p)

Progress report to show what results have been obtained, so far, using British fuels and raw materials and operating under British conditions. Diagrams, graphs, photograph, table.

13007 Carbon and Alloy Steel Castings. *Iron & Steel*, v. 28, June 1955, p. 291-295.

Discussion of the different aspects of technical control exercised by the metallurgical, methods, and maintenance departments. Examples of production in the medium, heavy, and induction divisions. Diagrams, photographs, table.

13008 Formation of Shrinkage Defects in Grey Iron Castings. J. Gittus. *Iron & Steel*, v. 28, July 1955, p. 331-335; Aug. 1955, p. 387-390.

Castings made in dried sand molds are sounder than those made in green sand, which is attributed to the higher rigidity of the dry mold, with the result that the size of a pipe in the casting is reduced, by expansion of the sand and by that of the solidifying eutectic. Photographs, diagrams, graphs. 1 ref. (To be continued.)

13009* Peculiarities in the Production of Heat-Resistant Castings. **Osobennosti proizvodstva zharoprochnykh otlivok.** (Russian.) V. P. Desnitskii. *Liteinoe Proizvodstvo*, 1955, no. 6, June, p. 1-4.

Main defects in the castings of austenitic steel; influence of steel composition versus method of casting; new method of casting which eliminates most of the defects. Drawings, micrographs. 5 ref.

13010* Casting the Body of the Turbine Wheel for the Kuibyshev Hydroelectric Plant. **Otlivka korpusa rabochego kolesa dlia kuibyshevskoi GES.** (Russian.) N. D. Vasil'ev. *Liteinoe Proizvodstvo*, 1955, no. 6, June, p. 4-9.

The technique of mold preparation and casting, using over 110 tons of liquid metal. Graph, photographs, tables, diagrams. 1 ref.

13011* Mechanization of the Lost Wax Casting Method. **Mekhanizatsiia proizvodstva lit'ia po vyplavliaemym modeliam.** (Russian.) A. V. Baranov, V. N. Ivanov, and N. M. Osokin. *Liteinoe Proizvodstvo*, 1955, no. 6, June, p. 9-15.

Design of machines for mixing wax; ovens for melting-out the investment. Diagrams.

13012 Pressure Die Casting at the Works of the Wolverhampton Die Casting Co., Ltd. *Machinery (London)*, v. 87, July 29, 1955, p. 253-261.

Equipment and operating techniques. Photographs.

13013* Metal Handling for Diecasting. H. K. Barton. *Mechanical World and Engineering Record*, v. 135, July 1955, p. 312-314.

Recent advances in automatic transfer methods. Diagrams, photographs.

13014 The Melting and Casting of Beryllium. P. Corzine and A. R. Kaufmann. Paper from THE METAL BERYLLIUM. p. 136-151. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Crucible and mold materials; protective atmospheres; melting equipment; casting defects and structures; centrifugal casting; refining effects of vacuum melting; comparison of cast Be with other forms. Diagrams, photographs. 5 ref.

13015* Mold Reaction of 90% Al-10% Mg Alloy. **Metaalvormreactie bij de 90/90 aluminium-magnesiumlegering.** (Dutch.) H. Boswinkel. *Metalen*, v. 10, no. 12, June 30, 1955, p. 237-240.

Definition of mold reaction; boric acid and Be as inhibitors; influence of Na and Be inhibitors on the alloy properties. Table, graphs. 8 ref.

13016 Pressure Die-Casting—A Re-Cap. *Metal Industry*, v. 87, July 22, 1955, p. 71-72.

Costs and economics of die casting processes; difficulties of limited production. Diagrams, photographs.

13017* Molding Materials, Methods and Machines. R. W. Heine and P. C. Rosenthal. *Modern Castings and American Foundryman*, v. 28, Aug. 1955, p. 39-54.

A review of the advantages and an evaluation of the processes in methods, equipment, and materials of molding. Photographs, tables, diagrams.

13018* New Sugar Formula Makes Sweet Core Binder. Charles J. Gogek. *Modern Castings and American Foundryman*, v. 28, Aug. 1955, p. 55-57.

Results of laboratory tests and a brief discussion of foundry trials are presented. Photographs, tables, graphs.

13019* Precision Casting by Lost Wax Method. **Odlewanie precyzyjne methoda wytapianych modeli.** (Polish.) H. Żakowa. *Prace Instytutów Ministerstwa Hutnictwa*, v. 7, nos. 2-4, 1955, p. 148-151.

Techniques used in preparation of patterns and molds for precision casting with reference to raw materials and equipment required. Precision casting of cutting tools and economic advantages obtained by application of this method. Photographs, micrograph. 14 ref.

13020 Bronze Die Castings by Vacuum. *Precision Metal Molding*, v. 13, Aug. 1955, p. 34-36, 75.

Principle; advantages; alloys applicable to the process; design freedom. Table, diagram, photographs.

13021* Capacity Drying of Foundry Cores. **Pojemnościowe suszenie rdzeni.** (Polish.) Tadeusz Skrzypek. *Przeglad Odlewnictwa*, v. 4, nos. 7-8, July-Aug. 1954, p. 219-224.

Core materials; physico-chemical and thermal phenomena during drying; drying kilns; operations and design economy. Graphs, tables, photographs, diagrams. 9 ref.

13022* Pouring of Heavy Steel Castings in Chemically Hardened Sand Molds. **Odlévání těžkých ocelových odlitků do forem z písku CT.** (Czech.) Václav Lupač and Karel Pluhar. *Slévárenství*, v. 3, no. 6, June 1955, p. 161-163.

Production experience; advantages of CO_2 hardening process. Graphs, photographs.

13023* Alloying of Cast Iron in Cupola by Means of Slags. **Legování litiny pomocí strusky v kuplovně.** (Czech.) Břetislav Sochor. *Slévárenství*, v. 3, no. 6, June 1955, p. 169-172.

Titanium and B pass from slags into cast iron, producing the same results as is obtained by addition of the corresponding ferroalloys. Micrographs, spectrograms.

13024* Castings Produced by Shell Molding. **Výroba odlitků do skořepinových forem.** (Czech.) Lev Petržela. *Slévárenství*, v. 3, no. 7, July 1955, p. 196-202.

Review of production methods, including molding techniques and testing. Photograph, diagrams, graphs.

13025* Solidification of Sand Casting. (English.) Goro Ohira. *Technology Reports, Tōhoku University*, v. 19, no. 2, 1955, p. 201-223.

Measurement of temperature in the metal and in the mold provides a versatile technique for analyzing the solidification mechanism. Investigates position and optimum size of the riser and its effect on casting. Tables, diagrams, graphs. 9 ref.

13026* Water-Cooled Cupola Brightens Future for Consistent Control of Castings. Leonard H. Wisner. *Western Metals*, v. 13, July 1955, p. 52-54.

Description, operation, and advantages of melting unit capable of positive control of the refining action and producing a superior quality metal for Meehanite castings. Photographs, diagram, table.

See also:

12473 (castings from glass molds)
12844 (foundry mechanical handling)
13092 (residual stresses in castings)
13231 (inoculation of nodular cast iron)
13357 (personnel management in foundries)

METALS—HEAT TREATMENT

13027 Propeller-Agitated Quenching. *American Machinist*, v. 99, July 18, 1955, p. 155, 157, 159; Aug. 1, 1955, p. 129, 131.

Effectiveness of and general rules for cooling the quench baths; no. of agitating units required. Table, graphs, photographs, diagrams.

13028* Town Gas for the Heat Treatment of Metals. G. A. Peterson. *Australasian Engineer*, 1955, June, p. 56-61.

Advantages of gas heating; use of special atmospheres prepared from town gas; manual and automatic control of gas equipment; design of gas fired furnaces. Diagram, photographs. 8 ref.

13029* A Case of Heat Treating Cast Irons: Annealing Treatment. **Un cas de traitement thermique des fontes: le traitement d'adoucissement par recuit.** (French.) Gabrielle Aubrion. *Fonderie*, 1955, no. 113, June, p. 4563-4572.

Theoretical study of different types of annealing treatment with some practical examples. Micrographs, photograph, diagram, graphs.

13030* Heat Treatments for Cast Steels. **Traitements thermiques des aciers moulés.** (French.) *Fonderie*, 1955, no. 113, June, p. 4573-4575.

Annealing of unalloyed steels; quenching and tempering methods. Tables, micrographs.

13031 Carbon Restoration Annealing for Uniformity of Bar Stock Structure. H. W. Callahan. *Industrial Heating*, v. 22, July 1955, p. 1412 + 5 pages.

Summary of the principal heat treatment carried out in a batch controlled-atmosphere furnace, the types of steels and range of stock sizes processed. Photographs, micrographs, diagrams.

13032 Simplify Approach to Titanium Heat Treatment. P. D. Frost. *Iron Age*, v. 175, June 30, 1955, p. 65-68.

Analysis of the metallurgy of Ti alloys permits the fabricator to make better use of them, and to understand their behavior and their susceptibility to "omega" embrittlement in hot forming and heat treating. Diagram, graphs, micrographs. 1 ref.

13033 Gas Purge for Consistent Carburizing Quality. P. M. Unterweiser. *Iron Age*, v. 176, July 28, 1955, p. 72-74.

Furnace purging with cracked city gas does not soot electrical resistance control elements. Photograph, graph, micrographs.

13034* Study of the Temperature of the Spark From the Apparatus for Electro-Spark Hardening of Metals. **Issledovanie temperatury iskry ot ustanovki dlia elektroiskrovogo uprochneniia metallov.** (Russian.) A. N. Liulichev and L. S. Palatnik. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia*, v. 19, no. 1, Jan.-Feb. 1955, p. 66-67 + 1 plate.

Relation between electrode diameter and spark temperature; effect of condenser capacity; spectroscopic analysis of spark. Spectrographs. 5 ref.

13035 Improve Cast Aluminum Alloys by Heat Treatment. B. L. Meredith. *Materials & Methods*, v. 42, July 1955, p. 108-110.

Metals—Heat Treatment

Use of solution and aging treatments to obtain better mechanical properties, stress relief to maintain dimensional accuracy, and stabilizing to obtain low stress level. Photographs, graph. 1 ref.

13036 Which Method for High Speed Surface Hardening? W. S. Hyler and H. J. Grover. *Materials & Methods*, v. 42, Aug. 1955, p. 103-105.

Advantages and limitations of induction and direct gas heating are compared, and production costs are evaluated. Photographs, table. 6 ref.

13037* Heat Treatment of Al-Mg Alloys With 9% Mg or More. **Warmtebehandeling der aluminium-magnesium legeringen met 9% magnesium en hoger.** (Dutch.) L. J. G. van Ewijk. *Metalen*, v. 10, no. 13, July 15, 1955, p. 269-273; no. 14, July 30, 1955, p. 291-297.

Basic composition of alloys (A 9, A 10.5, A 12, B 9, B 10.5, B 12). Influence of heat treatment conditions on the strength properties of alloys. Structure analysis; strength properties. Graphs, tables, diagrams, photographs, micrographs. 1 ref.

13038 Modern U. S. Gas Carburising and Carbonitriding Practice. Norbert K. Koebel. *Metallurgia*, v. 52, no. 309, July 1955, p. 3-10.

Discussion of early gas carburizing practice, modern practice, principle of the endothermic generator for producing the carrier gas, modern gas carbonitriding process, and design of modern carburizing and carbonitriding furnaces. Photographs, diagrams, graphs.

13039 Hardenability of Carbo-Nitrided Carbon Steel. R. H. Marshall. *Metal Progress*, v. 68, Aug. 1, 1955, p. 91-93.

Increase in grain size or Mn content increases hardenability of carbo-nitrided C steels. The effect of grain size is greater than the effect of Mn in the range investigated. Tables, graphs.

13040 Hardenability Bands for Tentative Standard H-Steels, Boron-Tested. *Metal Progress*, v. 68, Aug. 1, 1955, p. 104B.

Translated into simplified chart form the hardenability curves and data issued by the American Iron and Steel Institute. Graphs.

13041* Europe's Largest Furnace for Continuous Gas Carburizing. T. E. W. Preston. *Metalworking Production*, v. 99, July 8, 1955, p. 1205-1212.

Design, construction, and operation of a furnace which uses the enriched carrier gas technique for supplying C to work to be case hardened; butane, cracked on the work, gives the free C; temperature control of the order of ±5 F was achieved. Photographs, diagrams.

13042* Flame-Hardening by Oxy-Town Gas. *Metalworking Production*, v. 99, July 22, 1955, p. 1291-1292.

Some typical examples are given, including a description of machines installed for hardening diesel crankshaft pins and journals. Photograph.

13043 Annealing of Point Defects in Metals and Alloys. W. M. Lomer and A. H. Cottrell. *Philosophical Magazine*, v. 46, 7th ser., no. 378, July 1955, p. 711-719.

Analysis of published data on the recovery of resistivity during the annealing of metals at low temperatures, after damage by irradiation, quenching, or cold work. Table. 12 ref.

13044 Quench Hardening in Aluminum Single Crystals. R. Maddin and A. H. Cottrell. *Philosophical Magazine*, v. 46, 7th ser., no. 378, July 1955, p. 735-743 + 1 plate.

Results of experiments to alter the state of imperfection in single crystals of Al by means of heat treatment, and to examine this effect on the plastic properties of the crystals. Diagram, graph, tables, micrographs. 7 ref.

13045* Fundamentals and Requirements for the Accomplishment of the Oxy-Acetylene Stress Relieving. **Grundlagen und Bedingungen für die Durchführung des autogenen Entspannens.** (German.) H. G. Kunz. *Schweissen und Schneiden*, v. 7, no. 7, July 1955, p. 291-297.

Fundamentals; equipment and materials for stress relief; applications. Table, graphs, diagrams, photographs.

13046* Is Low Temperature Annealing Necessary? **Ist das autogene Entspannen erforderlich?** (German.) W. Soete. *Schweissen und Schneiden*, v. 7, no. 7, July 1955, p. 300-305.

Influence of initial stresses on deformations, brittle fracture of steel, fatigue of materials, stability of construction, and on corrosion. Graphs, diagrams, photographs. 12 ref.

13047 Fast Heating Is Practical and Safe. H. G. Grim. *Steel*, v. 137, July 18, 1955, p. 104-105.

Heating 20-ton work loads of die blocks for hardening in a cycle of 3 to 4 hr. Photographs, graph.

13048 Heat Treating Stainless Steels. I-II. W. E. McFee. *Steel*, v. 137, Aug. 8, 1955, p. 70-72; Aug. 15, 1955, p. 158-160, 162.

Precautions and details in annealing and hardening martensitic-Cr and PH types. Graphs, tables, photograph.

13049 The Metallographic View. XII. Hardenability, Its Meaning. H. E. Boyer. *Steel Processing*, v. 41, July 1955, p. 432.

Definition of the term hardenability and some factors which effect it in the heat treatment of steels. Diagram.

13050 High Powered Induction Heating in Shell Forging. H. J. Landsman and A. T. Lattauzeo. *Steel Processing*, v. 41, July 1955, p. 453-457.

Description of an installation for heating the nose end of 8-in. and 155 mm. artillery shells prior to the forging of the nose. Photographs, diagrams.

13051* Gas Carburising Atmospheres. L. G. W. Palethorpe. *Wild-Barfield Heat-Treatment Journal*, v. 5, June 1955, p. 10-15.

Separately generated atmospheres, furnace generated (drip feed) atmospheres, and the proprietary Carbodrip atmosphere are reviewed. Tables, diagrams, photographs. (To be continued.)

See also:

13139 (annealing of cast iron)
13234 (tempering Ni-Cr alloys)
13280 (age hardening)

METALS—MECHANICAL AND PHYSICAL PROPERTIES

13052 Calorimetric Investigations of a Gold-Nickel Alloy. I. Low Temperature Heat Capacity of Gold-Nickel Alloy. II. The Heat Capacity at High Temperatures and the Entropy of Formation. (English.) Warren DeSorbo and R. A. Oriani. *Acta Metallurgica*, v. 3, no. 3, May 1955, p. 227-235.

Values of entropy, enthalpy, and free energy evaluated from 13 to 300 K; estimate obtained of the vibrational contribution to the entropy of mixing; furnishes careful measurements of the deviation from the Kopp-Neumann rule. Tables, graphs. 53 ref.

13053 Tensile Properties of Annealed Tantalum at Low Temperatures. (English.) J. H. Bechtold. *Acta Metallurgica*, v. 3, no. 3, May 1955, p. 249-254.

Yield strength increased to 125,000 psi. at 195 C, but a brittle type fracture developed in this range. Tables, graphs, diagram. 17 ref.

13054 A Calorimetric Investigation of the System Silver-Tin at 450°C. (English.) O. J. Kleppa. *Acta Metallurgica*, v. 3, no. 3, May 1955, p. 255-259.

The heats of formation of ten different solid alloys ranging in composition from 75 to 94 at. % Ag were derived from the heats of solution of the alloys in liquid Sn. Graphs, tables. 11 ref.

13055 The Formation of Mechanical Twins. (English.) N. Thompson and M. Hingley. *Acta Metallurgica*, v. 3, no. 3, May 1955, p. 289-291.

Measurements of stress required to cause the appearance of twins in single crystals of Cd, both in tension and in compression. Tables, diagram. 5 ref.

13056 Effect of Order on the Electrical Resistivity of Ferromagnetic Alloys. (English.) F. J. Donahoe. *Acta Metallurgica*, v. 3, no. 3, May 1955, p. 292-293.

Four cases are discussed based on positions of the Curie and critical temperatures. Graphs. 5 ref.

13057 Grain Boundaries in Alloys of High Magnetic Permeability. (English.) R. E. S. Walters. *Acta Metallurgica*, v. 3, no. 3, May 1955, p. 293-294.

Relates development of high magnetic permeability in Ni-Fe-Cu-Mo alloys to reduction in grain boundries. Table, graph.

13058 An Electron Transfer Mechanism for Ultrasonic Attenuation in Metals. (English.) C. Kittel. *Acta Metallurgica*, v. 3, no. 3, May 1955, p. 295-297.

Suggests that in the superconducting state groups of electrons participate in the transfer process without interaction with latice phonons, provision for energy conservation presumably being made by an internal energy of the group. 8 ref.

13059 Double-Valued Internal Friction Behavior. (English.) H. K. Birnbaum. *Acta Metallurgica*, v. 3, no. 3, May 1955, p. 297-299.

Single crystals of NaCl, Ag, and Al relate type I (large hysteresis) and type II (small hysteresis) behavior. Graphs. 3 ref.

13060 Fatigue Analysis of Aircraft Bolts. Harold G. Brilmyer. *Aeronautical Engineering Review*, v. 14, July 1955, p. 48-54.

Tension fatigue tests of alloy-steel and Al Huckbolt installations, as well as standard aircraft (AN) bolt-nut combinations. Method for determining the tensile preload present in an installed fastener. Tables, graphs, diagrams, photographs. 19 ref.

13061* Experimental Researches on the Anisotropy of Extruded Sections of High Strength Light Alloys. **Indagini sperimentali sull'anisotropia degli estrusi di leghe leggere ad alta resistenza.** (Italian.) F. Gatto and L. Mori. *Alluminio*, v. 24, no. 3, May 1955, p. 241-247.

Minimum mechanical strength corresponds to an angle of 45° to the direction of extrusion, while the elongation attains its max. value for the same angle; minimum resilience is found in cross grained test rods. Pattern of fracture undergoes gradual change, depending on the angle of the tested rod with the direction of extrusion. Diagrams, micrographs, tables, graphs. 5 ref.

13062* Density and Viscosity of Liquid Aluminum and Aluminum Alloys. **Dichte und Viskosität von Schmelzen aus Aluminium und Aluminiumlegierungen.** (German.) E. Gebhardt, M. Becker, and S. Dorner. *Aluminium*, v. 31, nos. 7-8, July-Aug. 1955, p. 315-321.

Measurements have been made of the density and viscosity of super-purity Al, and Al-Cu, -Mg, -Fe, -Ti, and -Zn alloys to determine the effect of these properties on castability. Tables, graphs, diagram. 28 ref.

13063* The Electrical Conductivity of Super Purity Aluminum. **Die elektrische Leitfähigkeit von Reinstaluminium.** (German.) E. Nachtigall. *Aluminium*, v. 31, nos. 7-8, July-Aug. 1955, p. 341-342.

Shows that cold deformation affects the conductivity of 99,9964% Al much less than that of normal pure Al. Differences also occur between solution- and precipitation-heat treated metals. Graphs. 4 ref.

13064 A New Fatigue-Testing Machine Capable of Inducing Complex Stress-Time Relationships in Its Specimen. W. L. Starkey and S. M. Marco. *American Society of Mechanical Engineers, Paper No.* 54–A-80, 1954, 8 p. + 3 plates. (TJ1 Am35p)

Design of machine for investigating the effects of multiharmonic complex uniaxial stresses on the endurance lives of metals. Photographs, diagrams, graphs.

13065 Fatigue: The Problem and Some Solutions. G. R. Gohn. *American Society of Mechanical Engineers, Paper No.* 54–A-87, 1954, 6 p. + 2 plates. (TJ1 Am35p)

Causes and mechanism of fatigue. Examples are given to show that properly designed laboratory tests will yield fatigue data which can be applied to the solution of design problems. Micrographs, graphs, photograph. 8 ref.

13066 Friction in a Close-Contact System. Walter Claypoole. *American Society of Mechanical Engineers, Paper No.* 54–LUB-6, 1954, 11 p. + 2 plates. (TJ1 Am35p)

An attempt is made to clarify the terms "clean" and "smooth" as associated with the surface condition of test specimens used in investigations of frictional phenomena. A "practical model" of a close-contact friction system is set up and its behavior analyzed under specified operating conditions. Photographs, diagrams, graphs, micrographs. 7 ref.

13067 13067 A Progress Report on the Surface Endurance Limits of Engineering Materials. G. J. Talbourdet. *American Society of Mechanical Engineers, Paper No.* 54-LUB-14, 1954, 13 p. + 4 plates. (TJ1 Am35p)

Surface-wear tests to determine the load-life characteristics of materials subjected to rolling and combined rolling, and sliding actions. Tables, graphs, photographs, micrographs. 7 ref.

13068 The Elastic Limit and Yield Behavior of Hardened Steels. Hugh Muir, B. L. Averbach, and Morris Cohen. Paper from AMERICAN SOCIETY FOR METALS, TRANSACTIONS. v. XLVII. p. 380-399; disc., p. 399-407. 1955. American Society for Metals, Cleveland. (TS300 Am35t)

Dependence of mechanical properties of C steels on tempering temperature. Diagram, tables, graphs. 16 ref.

13069 Effect of Composition on Transverse Properties of Slack-Quenched Steel. John Vajda and Paul E. Busby. Paper from AMERICAN SOCIETY FOR METALS, TRANSACTIONS. v. XLVII. p. 408-420; disc., p. 421-422. 1955. American Society for Metals, Cleveland. (TS300 Am35t)

Effects of B, rare earth oxides, Si, Ni, and C on hardenability and mechanical properties. Table, graphs. 2 ref.

13070 Application of Cottrell's Theory of Yielding to Delayed Yield in Steel. John C. Fisher. Paper from AMERICAN SOCIETY FOR METALS, TRANSACTIONS. v. XLVII. p. 451-462. 1955. American Society for Metals, Cleveland. (TS300 Am35t)

A simple analysis of the Cottrell yield point mechanism; quantitative description of the delayed-yield phenomenon as observed in steels by Clark and Wood. Diagram, graphs, table. 8 ref.

13071 The Effects of Twisting on Tungsten Wires at High Temperatures. Takeo Fukutomi. Paper from AMERICAN SOCIETY FOR METALS, TRANSACTION. v. XLVII. p. 599-604. 1955. American Society for Metals, Cleveland. (TS300 Am35t)

Sample wires were first twisted and then released after a definite time of heating. The ratios of the angle of free rotation after releasing to the angle of given torsion were measured at various temperatures. Diagram, graph. 5 ref.

13072 Delayed Failure and Hydrogen Embrittlement in Steel. R. P. Frohmberg, W. J. Barnett, and A. R. Troiano. Paper from AMERICAN SOCIETY FOR METALS, TRANSACTIONS. v. XLVII. p. 892-925. 1955. American Society for Metals, Cleveland. (TS300 Am35t)

Delayed failure may occur over a wide range of relatively low applied stresses depending upon strength level, notch acuity and aging time after the introduction of H. The sensitivity to delayed failure may persist even though conventional tensile results indicate full ductility. The observed reductions in ductility are a function of both the depth of H penetration and the degree or severity of H embrittlement. Tables, graphs, photographs. 49 ref.

13073 Effects of Variation in Normalizing and Tempering Procedure on Stress Rupture Strength, Creep Embrittlement and Notch Sensitivity for a Cr-Mo-V and a 17 Cr-4Ni-4Cu Steel. M. H. Jones, D. P. Newman, G. Sachs, and W. F. Brown, Jr. Paper from AMERICAN SOCIETY FOR METALS, TRANSACTIONS. v. XLVII. p. 926-954; disc., p. 954-956. 1955. American Society for Metals, Cleveland. (TS300 Am35t)

Both notch sensitivity and smooth ductility, for both alloys, are greatly influenced by the heat treatment. High normalizing temperatures are particularly damaging to the ductility and the notch strength of the Cr-Mo-V steel. Tables, diagrams, graphs, micrographs. 15 ref.

Metals—Mechanical and Physical Properties

13074 The Effect of Time and Temperature on Various Mechanical Properties During Strain Aging of Normalized Low Carbon Steels. F. Garofalo and G. V. Smith. Paper from AMERICAN SOCIETY FOR METALS, TRANSACTIONS. v. XLVII. p. 957-983. 1955. American Society for Metals, Cleveland. (TS300 Am35t)

Effect of aging time and temperature, after plastic straining in tension or compression on the notch-impact transition temperature range, yield strength, tensile strength, and hardness was investigated for three low C steels in normalized condition. Tables, graphs. 26 ref.

13075 The Tensile Properties of Molybdenum at Elevated Temperatures. J. W. Pugh. Paper from AMERICAN SOCIETY FOR METALS, TRANSACTIONS. v. XLVII. p. 984-1001. 1955. American Society for Metals, Cleveland. (TS300 Am35t)

Detailed analysis was made of the tensile properties as a function of temperature. It is concluded that the excellent high temperature strength of this metal is due to strain aging. Tables, graphs, diagram, micrographs. 12 ref.

13076 A Theory of Fatigue-Damage Accumulation in Steel. D. L. Henry. *ASME, Transactions,* v. 77, Aug. 1955, p. 913-918; disc., p. 918.

A theoretical model for predicting the change in endurance limit resulting from the accumulation of overstressing cycles at moderate levels of overstress and for moderate degrees of fatigue damage. Tables, graphs. 14 ref.

13077* Thermal Shock. Some Experiments With Cast Iron. E. R. Evans. *British Cast Iron Research Association. Journal of Research and Development,* v. 5, June 1955, p. 643-654 + 12 plates.

Various designs of test pieces were investigated and the most suitable design was employed to study the effects of variations of composition on the thermal shock resistance of cast iron. Tables, photographs, diagrams. 4 ref.

13078 Effect of Hydrogen on the Properties of Alloys. N. A. Galaktionova. *Henry Brutcher Translation No.* 3448, 5 p. (From *Doklady Akademii Nauk SSSR,* v. 99, no. 3, 1954, p. 411-413.) Henry Brutcher, Altadena, Calif.

Investigates the effect of H present in permanent-magnet alloys, upon their magnetic and mechanical properties. Table, graph, photographs. 4 ref.

13079 Wear Resistance of Steel Surfaces. V. V. Chernyshev. *Henry Brutcher Translation No.* 3450, 9 p. (Abridged from *Vestnik Mashinostroeniya,* v. 32, no. 9, 1952, p. 54-57.) Henry Brutcher, Altadena, Calif.

Study of wear of various steels at different sliding speeds and specific pressures, between two cylindrical bodies, one of which is stationary, the other rotating. Tables, diagrams, photographs. 2 ref.

13080* Research on the Aluminium-Silicon-Zinc System Alloys for Castings. IV. Shigeo Oya. *Castings Research Laboratory, Reports, Waseda University,* 1955, no. 6, p. 27-30.

Effects of minor amounts of alloying constituents on microstructure and tensile strength. Tables, graphs, micrographs.

13081* Young's Modulus of Alloys. III. Cast Alloys of Cu-Zn Systems. Ichiro Iitaka and Toshimasa Morooka. *Castings Research Laboratory, Reports, Waseda University,* 1955, no. 6, p. 69-70.

Variations of Young's modulus on annealing of cast brasses; relation between Young's modulus and the percentage of Zn. Graphs, table.

13082* Form of Tensile Curves of Refined Al Monocrystals. **Forme des courbes de traction de monocristaux d'aluminium raffiné.** (French.) Bernard Jaoul and Paul Lacombe. *Comptes rendus,* v. 240, no. 25, June 20, 1955, p. 2411-2413.

Study of properties of the point of inflection and the form of deformation curves with refined Al monocrystals of various orientations, prepared after machining by critical cold working. Diagrams. 6 ref.

13083* Dislocation of the Deep Energy Layers of Iron Atoms During Cold Deformation of the Metal. **Sdvig glubokikh energeticheskikh urovnei atomov zheleza pri kholodnoi deformatsii metalla.** (Russian.) A. I. Krasnikov, L. I. Sotnikova, and L. G. Orlov. *Doklady Akademii Nauk SSSR,* v. 102, no. 5, June 11, 1955, p. 943-945.

Loads of 45,000 and 80,000 kg. per sq. cm. used; effect of alloying elements; relation between levels and valence; duplet distances calculated. Table. 6 ref.

13084* Effect of Impurities on the Surface Tension and Recrystallization of Tin. **O vlianii primesei na poverkhnostnoe natiazhenie i rekristallizatsiiu olova.** (Russian.) V. K. Semenchenko, E. Kristian, and V. I. Iveronova. *Doklady Akademii Nauk SSSR,* v. 102, no. 5, June 11, 1955, p. 973-975.

Effect of Al, Mn, Zn, Te, Bi, and Na impurities on grain size and polymorphic transformation of four types of Sn (purified by prolonged heating in vacuum, technical grade, etc.). Recrystallization temperatures. Table. 4 ref.

13085 Electromachining and Superfinihing as a Production Tool. II. The Finishing of Highly Stressed Parts. A. T. Steer. *Electroplating and Metal Finishing,* v. 8, July 1955, p. 245-249.

Essential requirements of finishes for highly stressed parts; effect of mechanical and electrolytic polishing treatments on fatigue limit; methods of reinforcing surfaces which have been weakened by electropolishing. Micrographs. 3 ref.

13086 A New Investigation of the Problem of Hardening. **Neuere Untersuchungen zur Frage der Aushärtung.** (German.) Werner Köster. Paper from L'ÉTAT SOLIDE. p. 235-261; disc., p. 262-271. 1952. Institut International de Physique Solvay, Brussels. (QC125 In7.4e)

Kinetic measurements for determination of the relationship between cold and hot hardening of Al-Ag alloys. Influence of quenching stress on the kinetics of hardening. Residual stresses during hardening. Tables, graphs, diagrams. 41 ref.

13087 The Yield Point in Single Crystal and Polycrystalline Metals. (English.) A. H. Cottrell. Paper from L'ÉTAT SOLIDE. p. 487-503; disc., p. 504-513. 1952. Institut International de Physique Solvay, Brussels. (QC125 In7.4e)

Review of experimental and theoretical work. Effects of impurities on yield points of single crystals. Graphs. 41 ref.

13088 The Dynamics of Slip. (English.) E. Orowan. Paper from L'ÉTAT SOLIDE. p. 535-565; disc., p. 566-576. 1952. Institute International de Physique Solvay, Brussels. (QC125 In7.4e)

Cause of the discrepancy between the calculated and observed values of the yield stress. Origin of dislocation mills; strain hardening. Diagrams. 32 ref.

13089* Standardization of Tensile Specimen Procedure for the Chevenard Micromachine in the Examination of Cast Aluminium Alloy Pieces. **Standardisation et emploi des éprouvettes de traction pour micromachine Chevenard destinées au contrôle des pièces moulées en alliages d'aluminium.** (French.) Claude Mascré. *Fonderie,* 1955, no. 113, June, p. 4551-4559.

Results of tests on standardization of Chevenard microspecimens and comparative study of these specimens. Diagrams, tables, micrographs. 4 ref.

13090* On the Calculation of Strengths of Conical Bottoms. **Zur Festigkeitsberechnung von Kegelböden.** (German.) R. Wahl. *Forschung auf dem Gebiete des Ingenieurwesens,* v. 21, Ausgabe B, no. 3, 1955, p. 75-86.

A method of approximation is presented for the calculation of stress distribution in conical bottoms which are annularly supported. Diagrams, graphs, photographs. 25 ref.

13091* Sliding Wear, Rinsing Wear, and Blasting Wear Under the Influence of Granular Solids. **Gleitverschleiss, Spülverschleiss, Strahlverschleiss unter der Wirkung von körnigen Stoffen.** (German.) Karl Wellinger and Herbert Uetz. *Forschung auf dem Gebiete des Ingeniuerwesens,* v. 21, Ausgabe B, *VDI-Forschungsheft* 449, 1955, 40 p.

Results of tests on a large quantity of flat and tubular test specimens, from various materials such as steel in various grades, chill casting, cast basalt, and rubberlike substances, tested for wear resistance against limestone, glass, coke dust, flint, river sand, quartz, garnet, corundum, silicon carbide, and casting shots of various hardness values. Tables, diagrams, photographs, graphs. 40 ref.

13092 Residual Stresses in Castings. A. Portevin and J. Pomey. *Foundry Trade Journal*, v. 99, July 7, 1955, p. 9-18.

Procedures for revealing, measuring, and classifying the presence or state of residual stresses, their distribution and intensity; factors promoting the origination and modification of the state of stress; influence of stresses on the existence, behavior, and use of metallic components; and results which apply to castings. Diagrams, graphs.

13093* Effect of Welding When Superposed Upon Prestrained Steel. (English.) Yoshio Ando, Isao Yamaguchi, Kunihiro Iida, and Yasuho Imai. *Institute of Industrial Science, Report, (University of Tokyo)*, v. 4, no. 7, Mar. 1955, p. 283-313.

Results of various tensile, bending, fatigue, corrosion, and notch brittleness tests in the investigation of this problem. Photographs, graphs, micrographs, diagrams, tables.

13094 Creep Behaviour at 300°C of a Group of Precipitation-Hardening Alloys Based on the Alpha Copper-Aluminium Phase. J. P. Dennison. *Institute of Metals, Journal*, v. 83, July 1955, p. 465-471 + 1 plate.

Results of experiments to provide creep data in various initial states and over a wide range of applied stresses and at a temperature where any structural changes in the unstressed condition take place at extremely slow rates, if at all. Tables, micrographs, graphs. 11 ref.

13095 Mechanical Twinning in Molybdenum. R. W. Cahn. *Institute of Metals, Journal*, v. 83, July 1955, p. 493-496 + 2 plates.

An investigation to find mechanical twins in Mo that have the same structure as Fe, and to apply complete crystallographic tests to establish firmly that they are twins. Diagrams, table, micrographs, photographs. 16 ref.

13096* The Elastic-Plastic Theory of Containers and Liners for Extrusion Presses. M. R. Horne. *Institution of Mechanical Engineers, Proceedings*, v. 169, no. 4, 1955, p. 107-117; disc., p. 118-122.

Design of containers and liners for steel extrusion is based on elastic-plastic behavior. Some anomalies are considered. Tables, graphs, diagrams. 13 ref.

13097 Cast Iron at Elevated Temperatures. *Iron & Steel*, v. 28, July 1955, p. 363-364.

An extensive survey of the literature and the results of preliminary tests on 12 commercial cast irons. Tables, graphs.

13098 Residual Plastic Strains Produced by Single and Repeated Spherical Impact. J. A. Pope and A. K. Mohamed. *Iron and Steel Institute, Journal*, v. 180, July 1955, p. 285-297.

Investigation, theoretically and experimentally, of the max. plastic strain and its penetration below the surface of a metal, resulting from single and repeated spherical impact. Variables studied were the velocity, energy, and diameter of the indentor. Table, graphs, diagrams. 18 ref.

13099 Specification of Thermally and Mechanically Induced Nonequilibrium States in AuCu by the Resistivity and Magnetoresistivity. Bernard Wiener, Gerhart Groetzinger, and Rathuel McCollum. *Journal of Applied Physics*, v. 26, July 1955, p. 857-862.

Investigation of the nonequilibrium states produced by: annealing of thermally disordered samples; annealing of samples, disordered by mechanical deformation, at two different temperatures; and, subjecting ordered samples to different amounts of mechanical deformation. Graphs, table. 10 ref.

13100 Elastic Constants of Germanium Between 1.7° and 80° K. M. E. Fine. *Journal of Applied Physics*, v. 26, July 1955, p. 862-863.

The elastic constants as well as the Young's and shear moduli approach constant values for very low temperatures as the third law of thermodynamics requires. Table, graphs. 7 ref.

13101 Condition of High-Velocity Ductile Fracture. E. Orowan. *Journal of Applied Physics*, v. 26, July 1955, p. 900-902.

Discussion of the circumstances surrounding the fracture of a sheet of pure Al foil. Diagrams.

13102 Activity of Sulphur in Liquid Fe-Ni Alloys. Jean A. Cordier and John Chipman. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Aug. 1955, p. 905-907.

Using gas equilibrium methods, the chemical behavior of S in liquid steel is independent of the Ni content and has the same activity and free energy in liquid Ni and Fe-Ni alloys as in liquid Fe. Table, graph. 7 ref.

13103 On the Loss of Texture in Tapes of a 50 Pct Ni-50 Pct Fe Alloy. S. Spachner and W. Rostoker. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Aug. 1955, p. 921-922.

Analyses of preferred orientations in tapes of various thicknesses. Effect of heat treatment on developed pole figures. Diffraction patterns, diagrams. 1 ref.

13104 Surface Tension at Elevated Temperatures. II. Effect of C, N, O and S on Liquid Iron Surface Tension and Interfacial Energy With Al_2O_3. F. A. Halden and W. D. Kingery. *Journal of Physical Chemistry*, v. 59, June 1955, p. 557-559.

At 1570 C surface tension of pure Fe is 1720 dynes $cm.^{-1}$. Oxygen and S form monolayers when below 0.1%. Table, graphs. 13 ref.

13105* Nitrogen in Cast Iron. **Azot v Chugune.** (Russian.) L. I. Levi. *Liteinoe Proizvodstvo*, 1955, no. 6, June, p. 22-25.

Experimental investigation of the influence of N content in cast iron on its structure and mechanical properties. Tables, micrographs. 10 ref.

13106 Superconductivity at the Clarendon Laboratory. K. Mendelssohn. Paper from LOW-TEMPERATURE PHYSICS. National Bureau of Standards Circular 519. p. 33-36. 1952. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (QC278 Un3.5L)

Results of studies on the isotope effect, mechanism of transition, and heat conductivity in the superconductivity and normal states. Table, graph.

13107 Superconduction Properties of Indium-Thallium Alloys. J. W. Stout and Lester Guttman. Paper from LOW-TEMPERATURE PHYSICS. National Bureau of Standards Circular 519. p. 51-60. 1952. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (QC278 Un3.5L)

Investigates the behavior of a solid solution, the In-Tl system, to determine the Meissner effect and the resistance transition curve. Tables, graphs, diagrams. 7 ref.

13108 Investigation of Superconductivity in Lead Compounds, Gold Alloys, and Molybdenum Carbide. R. P. Hudson and K. Lark-Horovitz. Paper from LOW-TEMPERATURE PHYSICS. National Bureau of Standards Circular 519. p. 61-63. 1952. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (QC278 Un3.5L)

Use of the ballastic-throw magnetic method of detection to distinguish between a bulk effect and an impurity. 7 ref.

13109 Magnetic Properties of a Hollow Superconducting Lead Sphere. Julius Babiskin. Paper from LOW-TEMPERATURE PHYSICS. National Bureau of Standards Circular 519. p. 77-79. 1952. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (QC278 Un3.5L)

Results of measurements to determine the nature of the equatorial magnetic field distributions inside and outside a hollow sphere. Graphs. 5 ref.

13110 Eddy Currents and Supercurrents in Rotating Metal Spheres at Liquid-Helium Temperatures. P. B. Alers, J. W. McWhirter, and C. F. Squire. Paper from LOW-TEMPERATURE PHYSICS. National Bureau of Standards Circular 519. p. 85-88. 1952. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (QC278 Un3.5L)

Metals—Mechanical and Physical Properties

Data to show the similarity between the intensity and distribution of the eddy currents and the super-conducting surface currents that produce the Meissner effect. Diagram, graphs. 2 ref.

13111 Atomic Heat of Indium at Liquid-Helium Temperatures. J. R. Clement and E. H. Quinnell. Paper from LOW-TEMPERATURE PHYSICS. National Bureau of Standards Circular 519. p. 89-97. 1952. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (QC278 Un3.5L)

A report of some calorimetric measurements to determine the specific heat of superconducting elements in both the normal and superconducting states. Diagram, graph. 11 ref.

13112 High-Frequency Resistance of Tin, Lead, and Indium. C. J. Grebenkemper and John P. Hagen. Paper from LOW-TEMPERATURE PHYSICS. National Bureau of Standards Circular 519. p. 103-108. 1952. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (QC278 Un3.5L)

Surface resistance of several metals was measured, using a resonant cavity of cylindrical shape operating in the lowest mode. Graphs. 6 ref.

13113 A New Effect Found in Paramagnetic Crystals Below 100 Millidegrees Absolute: The Critical-Field Curve Bounding the Antiferromagnetic State. C. G. B. Garrett. Paper from LOW-TEMPERATURE PHYSICS. National Bureau of Standards Circular 519. p. 229-233. 1952. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (QC278 Un3.5L)

Summary of the evidence for the existence of "critical-field" phenomena in antiferromagnetic crystals, considering, in particular, the results of some magnetic measurements made at temperatures below 1 K on a single crystal of cobalt-ammonium sulfate. Graph. 6 ref.

13114 Current Sensitivity and Other Characteristics of Metal Films at Low Temperatures. A. van Itterbeek. Paper from LOW-TEMPERATURE PHYSICS. National Bureau of Standards Circular 519. p. 243-247. 1952. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (QC278 Un3.5L)

Observations on the resistance of thin Ni films at low temperatures. Graphs, micrographs. 5 ref.

13115 Normal Resistivities at Low Temperatures. K. Mendelssohn. Paper from LOW-TEMPERATURE PHYSICS. National Bureau of Standards Circular 519. p. 253-256. 1952. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (QC278 Un3.5L)

Study of the temperature dependence of the resistivity of the alkali and alkaline earth metals. Graphs.

13116 Approximate Calculations of the Surface Impedance of a Metal in the Anomalous Region. P. M. Marcus. Paper from LOW-TEMPERATURE PHYSICS. National Bureau of Standards Circular 519. p. 265-272. 1952. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (QC278 Un3.5L)

Description of the phenomenon in metals, considering the current and field separately as functions of position. Graphs, diagram. 6 ref.

13117 Specific Heat on Silicon Below 100°K. P. H. Keesom and N. Pearlman. Paper from LOW-TEMPERATURE PHYSICS. National Bureau of Standards Circular 519. p. 279-283. 1952. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (QC278 Un3.5L)

Extension of the measurements of specific heat of Si to a max. of 103 K. Graphs. 11 ref.

13118* Neutrons, Gamma Rays, & Wear. A. Hundere, G. C. Lawrason, and J. P. O'Meara. *Lubrication Engineering*, v. 11, July-Aug. 1955, p. 230-237.

Brief summary of experiences and results obtained in utilizing the radioactive tracer technique for studying wear. Photographs, diagrams, graphs, table. 5 ref.

13119* Atoms Trace the Wear. W. R. Miller and H. R. Jackson. *Lubricating Engineering*, v. 11, July-Aug. 1955, p. 238-241.

Radioactive piston ring technique, a new tool for measuring engine wear. Tables, graphs.

13120* The Influence of Moisture on the Friction & Surface Damage of Clean Metals. R. O. Daniels and A. C. West. *Lubrication Engineering*, v. 11, July-Aug. 1955, p. 261-266.

A controlled atmosphere, low-speed friction apparatus for fundamental boundary lubrication studies is described. Photographs, micrograph, graphs, diagrams. 13 ref.

13121 The Physical and Mechanical Properties of Beryllium Metal. D. W. Lillie. Paper from THE METAL BERYLLIUM. p. 304-327. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Data on the properties which define and restrict the current utility of Be. Tables, graphs. 40 ref.

13122 The Relation of Purity to Brittleness in Beryllium. A. R. Kaufmann. Paper from THE METAL BERYLLIUM. p. 367-371. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

A critical review of conclusions, that impurities are not responsible for brittleness, in the light of recent work which has shown that ductility exists in certain crystallographic directions in Be single crystals of nominal purity. Table. 3 ref.

13123 Ductility of Beryllium as Related to Single Crystal Deformation and Fracture. G. L. Tuer and A. R. Kaufmann. Paper from THE METAL BERYLLIUM. p. 372-424. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Large single crystals can be prepared by direct solidification from the melt in a suitably shaped mold and under proper cooling conditions. The important aspects of the deformation and fracture processes are: slip, twinning, kinking, deformation bands, deformation at room temperature, effect of temperature on deformation, and fracture. Diagrams, photographs, tables, micrographs. 29 ref.

13124 Ductility of Beryllium as Related to Preferred Orientation and Grain Structure. J. L. Klein, V. G. Macres, D. H. Woodard, and J. Greenspan. Paper from THE METAL BERYLLIUM. p. 425-465. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Review of the effect of fabrication variables on the ductility of Be. Study of the metallurgical factors which affect the room temperature ductility of Be and development of methods for producing Be rod and sheet which have much more ductility than was previously considered possible for this metal. Diagrams, graphs, micrographs, tables, photograph. 10 ref.

13125* Characteristics and Applications of Microhardness. **Wesen und Anwendungen der Mikrohärte. I.** (German.) H. Buckle. *Metall*, v. 9, nos. 13-14, July 1955, p. 549-554.

Defines microhardness and shows errors in the determination technique. Table, graphs, diagrams. 36 ref.

13126* Small-Load Hardness, Its Elasticity, Plasticity, and Fracture Constituents. **Kleinlasthärte, ihre elastischen, plastischen und Bruchanteile.** (German.) P. Grodzinski. *Metall*, v. 9, nos. 13-14, July 1955, p. 554-560.

Study of plastic and elastic hardness; a new definition of hardness; types of fractures. Graphs, diagrams, micrographs. 25 ref.

13127* Investigation of the Cutting Properties of WC-TiC-Co Alloys. **Untersuchungen über die Schneideigenschaften von WC-TiC-Co-Legierungen.** (German.) H. J. Booss. *Metall*, v. 9, nos. 13-14, July 1955, p. 560-564.

Preparation and analysis of hard metals; influence and composition of free C and Co content on cutting properties. Tables, graphs. 23 ref.

13128 Examination of Microstructures Under Varying Stress. Richard A. Flinn and Paul K. Trojan. *Metal Progress*, v. 68, July 1955, p. 88-89.

A bend test apparatus is described that permits continuous microscopic examination of metal specimens while they are being loaded to fracture. Photograph, micrographs.

13129 Properties of Arc-Cast Molybdenum. Norman L. Deuble. *Metal Progress*, v. 68, July 1955, p. 105-110.

High-temperature strength is increased by alloying to higher levels than that obtained with conventional gas-turbine alloys. Tables, graphs.

13130 Stress-Rupture Strength of Thermenol. (Digest of "Preliminary Investigation of Stress-Rupture and Tensile Strength of Thermenol, an Iron-Aluminum Alloy", by Charles A. Gyrogak; *U. S. National Advisory Committee for Aeronautics, Research Memorandum* M-E54F10, Aug. 1954.) *Metal Progress*, v. 68, July 1955, p. 164-166.

Investigation to determine stress-rupture life at 1100 and 1200 F, room-temperature tensile strength, and bend ductility.

13131 Fatigue of Aluminum Alloys. (Digest of "Fatigue of Aluminium", by R. L. Templin; presented at the Chicago Meeting of the American Society for Testing Materials, June 15, 1954.) *Metal Progress*, v. 68, Aug. 1, 1955, p. 170, 172, 174, 176.

Mechanism of fatigue failures; factors affecting fatigue strength.

13132 Fatigue Failure After Chromium Plating. (Digest of "Fatigue Cracking of Two Chromium-Plated Crankshafts"; *British Engine Boiler and Electrical Insurance Co., Ltd., Technical Report*, v. 2, Sept. 1954, p. 165-177.) *Metal Progress*, v. 68, Aug. 1, 1955, p. 186, 188.

Chromium plating should not be used for parts which will be subjected to alternating stresses in service, unless the plating rate is slow, the deposits, are very thin, and the parts are heat treated above 570 F after plating.

13133* The Effect of Tellurium Additions on Cast Iron. (Japanese.) Bin-ichi Kawamura and Junzō Aono. *Metals (Japanese)*, v. 25, no. 7, July 1955, p. 493-497.

Relation of hardness to the percentages of Te added to the molten Fe and its effect on resulting micro-structure. Photograph, micrographs, graphs, tables.

13134 You Can Prevent Fatigue Failures. J. J. McKetta and W. G. Dudley. *Petroleum Refiner*, v. 34, July 1955, p. 127-128.

Mechanisms of fatigue failures; methods of testing and of detecting incipient fatigue failures. 9 ref.

13135 The Specific Heats of Magnesium and Zinc. P. L. Smith. *Philosophical Magazine*, v. 46, 7th ser., no. 378, July 1955, p. 744-750.

Experimental procedures and results of measurements between 1 and 20 K on Mg and 4 and 20 K on Zn. Graphs. 12 ref.

13136* Magnetic Properties of Cobalt Telluride. (English.) Enji Uchida. *Physical Society of Japan, Journal*, v. 10, no. 7, July 1955, p. 517-522.

Results are reported for Co Te_x, where x is the molal content, with measurements made in the temperature range between liquid air and 1150 C. Tables, graphs. 9 ref.

13137* On the Maze Domain of Silicon-Iron Crystal. I. (English.) Sōshin Chikazumi and Kenzō Suzuki. *Physical Society of Japan, Journal*, v. 10, no. 7, July 1955, p. 523-534.

Examination of the maze-like domain which appears on the mechanically polished surface of a Si-Fe crystal by powder pattern techniques. Micrographs, graphs, diagrams. 5 ref.

13138* The Significance of Micro-Structural Examination in Metallurgical Investigations. **Znaczenie badania mikrostruktur w ekspertyzach metaloznawczych.** (Polish.) W. Haczewski, Z. Wójcik, and J. Ogerman. *Prace Instytutów Ministerstwa Hutnictwa*, v. 7, nos. 2-4, 1955, p. 179-182 + 4 plates.

Determines causes of premature deterioration of railroad rails, cracking of carburized alloy steel gears, and deep drawing failures of low C steel sheet products. Micrographs, photographs, diagrams, graphs.

13139* The Effect of Aluminum Additions on the Annealing and Properties of Black-Heart Malleable Cast Iron From the Cupola. **Wpływ dodatku aluminium na wyżarzanie i własności czarnego żeliwa ciągliwego z żeliwiaka.** (Polish.) Jan Rączka. *Przeglad Odlewnictwa*, v. 4, no. 4, Apr. 1954, p. 99-104.

Effect of Al on cementite-pearlite transformations; hardness and strength during annealing at 950 and 710 C. Tables, micrographs, graphs. 6 ref.

13140* Substitute Alloys for the Tin Bronzes Used in Casting Production. **Stopy zastępcze brązów cynowych stosowanych w odlewnictwie.** (Polish.) Zbigniew Górny and Krzysztof Rutkowski. *Przeglad Odlewnictwa*, v. 4, nos. 7-8, July-Aug. 1954, p. 196-205.

Necessity for economizing on Sn and Cu has led to the designing of special bronzes and brasses, with Al, Fe, Ni, and Mn contents; examples of SN-P, Sn-Zn, and Sn-Zn-Pb bronzes; strength, hardness, and other tests. Tables, graphs, diagrams.

13141* The Influence of Elements of Low Solubility on the Properties of Ferrite. **Influence des éléments de faible solubilité sur les propriétés des ferrites.** (French.) W. P. Rees. *Revue de métallurgie*, v. 52, no. 5, May 1955, p. 375-391.

Direct attention to the very large effects which very small amounts of C, N, and O have on the properties of Fe. The influence of these three elements is dependent on the rate at which the alloys are cooled from an elevated temperature. Photographs, micrographs, diagram, graphs, tables. 7 ref.

13142* Lowering of the Yield Point of Annealed AG5 by a Second Annealing Following a Weak Deformation. **Au sujet de l'abaissement de la limite d'écoulement de l'AG5 recuit par un deuxième recuit consécutif à une faible déformation.** (French.) M. Renouard and H. Stelljes. *Revue de métallurgie*, v. 52, no. 5, May 1955, p. 392-396.

It was observed that after a brief deformation, followed by a non-recrystallizing annealing, the yield point of some Al-Mg alloys is lower than that obtained by a single annealing or by two consecutive annealings without intermediary deformation. Diagrams, graphs. 3 ref.

13143* Iron Carbonitrides Properties. **Propriétés des carbonitrures de fer.** (French.) R. Bridelle and A. Michel. *Revue de métallurgie*, v. 52, no. 5, May 1955, p. 397-400.

The carbonitrided phases which Fe gives are studied. For each phase conditions of formation, structural characteristics, the Curie Point, and the thermic evolutionary process are specified. Graphs. 14 ref.

13144 Experimental Investigation of Shear Strength and Shear Deformation of Unstiffened Beams of 24 S-T Alclad With and Without Flanged Lightening Holes. Gunnar Anevi. *SAAB Aircraft Company, Technical Note, SAAB TN* 29, 1955, 59 p. (TL504 Sv23t)

Determination of shear intensity at failure and at commencement of permanent deformation, and initial stiffness. Diagrams, tables, graphs, photographs.

13145 Scatter in Fatigue Life of 24S-T Alclad Specimens With Drilled Holes. Waloddi Weibull. *SAAB Aircraft Company Technical Notes, SAAB TN* 32, 1955, 17 p. (TL504 Sv23t)

Fatigue lifetimes of specimens were determined at a tension pulsating between 14 kg. sq. mm. and zero. Marked difference existed in fatigue properties of the different plates and also between longitudinal and transversal speciments in regard to the direction of rolling, but an average distribution function for each source was obtainable. Tables, diagram, graphs.

13146 How to Curb Chrome-Plate Fatigue. J. E. Stareck, E. J. Seyb, and A. C. Tulmello. *Steel*, v. 137, Aug. 8, 1955, p. 82-83.

This trouble greater in high strength steels, is controlled by a new Cr plating process. Graphs.

13147* Study of the Strength of Connections of Main Girders of All-Welded Span Structures. **Issledovanie prochnosti uzlov glavnykh ferm tsel'nosvarnykh proletnykh stroenii.** (Russian.) D. I. Navrotskii. *Svarochnoe Proizvodstvo*, 1955, no. 7, July, p. 4-7.

Distribution of stresses, with static and vibration loads; effect of shape of connections. Diagrams, photographs, tables, graphs. 3 ref.

13148 Properties of Germanium and Silicon. Esther M. Conwell. *Sylvania Technologist*, v. 8, July 1955, p. 86-90.

Review of recent Ge and Si research. Information on the band structure and effective masses is presented and an account is given of such successes in the areas of infra-red absorption and magnetic field effects. Diagrams, graph. 32 ref.

Metals—Mechanical and Physical Properties

13149* Effect of Annealing on Electric Resistance of Cold-Worked Brasses. (English.) Masayuki Kawasaki, Kenji Okuda, and Yōji Takahashi. *Technology Reports, Tōhoku University*, v. 19, no. 2, 1955, p. 178-191.

Changes in resistance of the brasses, subject to subsequent annealing, are divided into a two-stage behavior—one corresponding to recovery, the other to recrystallization. Data presented to clarify aspects of recovery kinetics. Table, diagrams, graphs. 14 ref.

13150* On the Two Types of Kink Band in Aluminium Crystals. (English.) T. Ichiyama and M. Kurihara. *Technology Reports, Tōhoku University*, v. 19, no. 2, 1955, p. 192-200.

Discussion of differences between the two types of deformation bands; namely, the kink and the band of secondary slip. Diagrams, micrographs. 11 ref.

13151 Axial-Load Fatigue Properties of 24S-T and 75S-T Aluminum Alloy as Determined in Several Laboratories. H. J. Grover, W. S. Hyler, Paul Kuhn, Charles B. Landers, and F. M. Howell. *U. S. National Advisory Committee for Aeronautics, Report* 1190, 1954, 25 p. (TL521 Un3r)

Results obtained in the determination of the fatigue properties of 24S-T3 and 75S-T6 Al alloys widely used in airframe construction. Photographs, diagrams, graphs, tables, micrographs. 12 ref.

13152 Preliminary Investigation of the Compressive Strength and Creep Lifetime of 2024-T3 (Formerly 24S-T3) Aluminum-Alloy Plates at Elevated Temperatures. Eldon E. Mathauser and William D. Deveikis. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* L55E11b, June 1955, 12 p. (TL782 Un3rm)

Testing of plates supported in V-grooves. Comparison of tensile and compressive creep lifetime. Graphs. 4 ref.

13153* The Strains and the Energy in Thin Elastic Shells of Arbitrary Shape for Arbitrary Deformation. (English.) Erich S. Weibel. *Zeitschrift für angewandte Mathematik und Physik*, v. 6, no. 3, May 1955, p. 153-189.

Review of some fundamental equations of equilibrium and motion, and methods for the solution of these equations for special cases. Diagrams, graph. 5 ref.

13154* Magnetic Investigation of Internal Stress of Carbon Steel Under Plastic Deformation. **Magnetische Untesuchungen über innere Spannungen in plastisch gedehntem Kohlenstoffstahl.** (German.) Ludwig Reimer. *Zeitschrift für angewandte Physik*, v. 7, no. 6, June 1955, p. 282-284.

Comparison of X-ray and magnetic methods of study; magnetization curve after plastic deformation and its dependence on the temperature of heat treatment. Graphs. 10 ref.

13155* The Significance of the Relationship Between Vickers Hardness and Load. **Zur Deutung der Lastabhägigkeit der Vickershärte.** (German.) August Braun. *Zeitschrift für Metallkunde*, v. 46, no. 7, July 1955, p. 499-503.

Elastic resilience; problem and form of load dependence. Graphs, diagrams, tables. 2 ref.

13156* Electrical Properties of Alloys of the System NiTe-$NiTe_2$. **Elektricheskie svoistva splavov sistemy NiTe-$NiTe_2$.** (Russian.) V. P. Zhuze and A. R. Regel'. *Zhurnal Tekhnicheskoi Fiziki*, v. 25, no. 6, June 1955, p. 978-983.

Electrical conductivity, its temperature coefficient, thermoelectromotive force, and temperature conductivity of a system with composition ranging from 33 to 50 at.% Ni in Te. Graphs, tables. 9 ref.

Books and Miscellaneous Publications

13157* Bibliography on Residual Stress. T. C. Huang. 196 p. 1954. Society of Automotive Engineers, New York. (ZTA460 H86b)

Measurement, occurrence, control, removal, and effects of residual stresses.

See also:

12680 (stresses and strains in deposited coatings)
12815 (magnetic susceptibility measurement)
13208 (internal friction in α-iron)
13218 (directional properties in aluminum alloys)
13236 (activation energy in Fe-Ni alloys)
13295 (magnetic properties of Cu-Ni powders)
13339 (tensile and yield strengths of aluminum alloys)

METALS—MECHANICAL WORKING

13158 How to Machine Uranium. Alexander Denst and H. V. Ross. *American Machinist*, v. 99, Aug. 1, 1955, p. 95-97.

Details of methods developed by the AEC. Photographs.

13159 Gears Untouched by Human Hands. George H. De Groat. *American Machinist*, v. 99, Aug. 1, 1955, p. 111-120.

Details of automatic loaders and conveyors, tools, inspection, and sorting in production of pinion gears. Diagrams, photographs.

13160 Fatigue Strength of Flame-Cut Specimens in Black Mild Steel. F. Koenigsberger and H. W. Green. *British Welding Journal*, v. 2, July 1955, p. 313-321.

Shows that the heating effect of the cutting process has no greater influence on the fatigue resistance than the presence of the scale inherently present on mild steel. Table, diagrams, graphs, photographs, micrographs. 4 ref.

13161* Friction in the Sheet Drawing. Hiroshi Yamanouchi and Ikuhiko Hayashi. *Castings Research Laboratory, Reports, Waseda University*, 1955, no. 6, p. 58-60.

Measurements of die pressure and drawing force; influence of die shape; comparison of experimental data with theoretical values. Diagrams, graphs.

13162* The Cutting Mechanism of Brass Containing Lead. Fusao Hayama. *Castings Research Laboratory, Reports, Waseda University*, 1955, no. 6, p. 61-64.

Analysis of machinability by applying plasticity theory to cutting parameters. Graphs, diagram.

13163* Lead Extrusion at Various Speeds. Yuji Matsuura. *Castings Research Laboratory, Reports, Waseda University*, 1955, no. 6, p. 65-68.

Effects of die angles and reductions, and extrusion rates on extrusion pressures. Graphs, photographs.

13164* Modern Stainless Steels. *Edgar Allen News*, v. 34, July 1955, p. 157-158.

Methods of drilling, tapping, sawing, and milling. Photographs. (To be continued.)

13165* The Grinding of Steel. XXV. Grinding and Finishing Machines. *Edgar Allen News*, v. 34, July 1955, p. 159-160.

Description and capabilities of roll-grinding, universal, and other grinding machines. Photograph, graph. (To be continued.)

13166 Testing the Accuracy of Jig Boring Machines. T. R. Oakley. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. I. p. 303-319; disc., p. 319-321. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Measuring equipment; alignment and flatness testing. Graph, diagrams, photographs.

13167 Special Lathe at the National Physical Laboratory for Cutting and Forming Fine-Pitch Screw Threads. V. W. Stanley. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. I. p. 329-344; disc., p. 344-345. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

A high precision lathe is described capable of producing fine-pitch screws ranging from about 100 to 30,000 threads per in. Diagrams, photographs, graph. 3 ref.

13168 Gear Shaving. A. Sykes. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. II. p. 359-377; disc., p. 404-413. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Cutters and cutting processes; inspection methods. Photographs, diagrams.

13169 The Practical Approach to Engineering Fine Surfaces. D. B. Ebsworth. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. II. p. 629-651; disc., p. 561-644. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Principles, equipment, and methods of honing and lapping. Diagrams, graphs, photographs, table.

13170* Hammers and Presses for Drop or Press Forging Heavy Pieces. **Młoty i prasy do kucia ciężkich odkuwek w matrycach.** (Polish.) Wiesław Wróblewski. *Hutnik*, v. 22, no. 4, Apr. 1955, p. 127-130.

Characteristic design features, advantages, disadvantages, and dimensions of the largest present-day drop-forging hammers and presses. Table, diagrams, photograph. 9 ref.

13171 Manufacture and Properties of Large Forgings. II. Adolph O. Schaefer. *Industrial Heating*, v. 22, July 1955, p. 1394 + 6 pages.

The cycle for heating a 116-in. ingot to forging temperatures and subsequent heat treating cycles are described. Photographs, tables, diagrams.

13172* Surface Friction and Lubrication in Cold Strip Rolling. P. W. Whitton and Hugh Ford. *Institution of Mechanical Engineers, Proceedings*, v. 169, no. 5, 1955, p. 123-133 + 2 plates; disc., p. 133-140.

Method of measuring the friction in the roll gap under the conditions of the cold rolling process without making use of any theory of the distribution of roll pressure along the contact arc. Method, and friction coefficients so found are used to compare calculated and measured values of roll force and torque. Diagram, tables, graphs, photographs, micrographs. 31 ref.

13173 Metal Gathering: What It Is and How It Works. W. E. Achor. *Iron Age*, v. 176, July 14, 1955, p. 99-102.

This process accumulates plastic metal under pressure at the ends or in the middle of tubing or bar stock. Increased strength, good grain flow, and uniform metallurgical properties are obtained. Savings in handling, reduction in wt., and elimination of machining are often possible. Diagrams, photographs.

13174 Tracer Lathe Saves Setup and Machining Time. Herbert Chase. *Iron Age*, v. 176, July 28, 1955, p. 66-67.

Details of automatic operation in machining precombustion chambers for diesel engines. Photograph, diagram.

13175 Integrated Fastener Setup Shortens Delivery Time. E. C. Beaudet. *Iron Age*, v. 176, Aug. 11, 1955, p. 92-94.

Ferrous and non-ferrous billets are cast from induction furnaces, extruded into bar, rod, and wire on a 1650-ton press and extrusions are then drawn to size for fastener production. Photographs, micrographs.

13176 Can Controlled Temperature Rolling Improve Drawability. N. P. Goss. *Iron Age*, v. 176, Aug. 11, 1955, p. 100-102.

Process rolls sheet at 500 F and produces a random orientation. Transverse and longitudinal properties are more compatible and improved "drawability" is the result. Diagrams, diffraction patterns.

13177 Induction Heating. M. C. D. Hobbs. *Iron & Steel*, v. 28, June 1955, p. 315-316, 318.

Advantages and applications of induction heating of ingots in preparation for the billet mill. Photographs.

13178 Detroit Steel Corporation's Multiple-Fueled Soaking Pits. F. C. McGough. *Iron and Steel Engineer*, v. 32, July 1955, p. 55-61; disc., p. 61-64.

Practicality of firing circular type pits with low calorific mixed gas and preheated combustion air with burners which can also handle richer gases. No adverse effects were noticed on mill operations and definite savings were accomplished from the use of blast furnace gas. Photographs, diagrams.

13179 Performance Factors Affecting Bar Mill Cooling Bed Arrangement. E. C. Peterson. *Iron and Steel Engineer*, v. 32, July 1955, p. 65-74.

The most common factors are the ability of the bed to discharge bars from the mill runout table, as well as to cool the mill production, and ability of the cold bar shear to dispose of the cooled bars. Photographs, graphs, tables.

13180 Continuous Drawing of Cold Finished Bars. Walter J. Prochak. *Iron and Steel Engineer*, v. 32, July 1955, p. 95-98.

Continuous operation reduces handling, increases yield, lessens maintenance, practically eliminates hazards, and reduces the operating crew by about 40%. Photographs.

13181 High-Pressure Forming on Verson-Wheelon Presses. O. E. Wheelon. *Machinery*, v. 61, Aug. 1955, p. 149-155.

Recent developments in the forming of steel sheets with an inflated rubber bag. Photographs, diagrams.

13182 Impact (Cold) Extruded Parts. John L. Everhart. *Materials & Methods*, v. 42, Aug. 1955, p. 111-126.

Describes the impact extrusion process and discusses sizes, shapes, limitations, and applications of parts produced from Al and Al alloys, steels, Mg and Mg alloys, and other non-ferrous metals. Photographs, table, diagrams, graphs.

13183* Press Tool Devices for Continuous Production From Strip. *Mechanical World and Engineering Record*, v. 135, July 1955, p. 298-301.

Design and application of various types of stops for blanking dies. Diagrams.

13184 Mechanical Working of Beryllium by Extrusion. P. Loewenstein, A. R. Kaufmann, and S. V. Arnold. Paper from THE METAL BERYLLIUM. p. 241-261. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Present day techniques; study of variables; special problems of powder and bare extrusion. Diagrams, X-rays, graphs, photographs. 5 ref.

13185 Mechanical Working of Beryllium by Rolling, Forging and Similar Processes. Shields M. Bishop. Paper from THE METAL BERYLLIUM. p. 262-272. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Rolling of metal fabricated by various methods, forging and hot coining, and swaping are discussed. Photographs, graph. 28 ref.

13186 Machining of Beryllium. Leslie E. Duran. Paper from THE METAL BERYLLIUM. p. 273-282. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Machining by turning, milling, drilling, reaming, grinding, sawing, in addition to cutting tools, feeds, and speeds, and comparisons made with more common metals exhibiting similar machining characteristics. Table, diagrams, photographs. 3 ref.

13187* Machining by Electric Spark. **L'usinage par étincelage.** (French.) D. W. Rudorff. *Métallurgie et la construction mécanique*, v. 87, no. 6, June 1955, p. 489 + 5 pages.

Fundamental principles; conditions for operation; equipment. Diagrams, photographs. 3 ref.

13188 Drawing Failures in Extruded Shells. Hubert J. Pessl. *Metal Progress*, v. 68, Aug. 1, 1955, p. 80-81.

The cause of a steadily increasing rate of drawing failures of cold extruded 75 mm. shells could not be found until the punch broke. Failure was due to fatigue originating as a "flake". Stresses in drawing had caused the punch to increase in diameter and pinch the shells. Photographs.

13189 Two Decades of Progress in Drop Forging. H. J. Merchant. *Metal Treatment and Drop Forging*, v. 22, June 1955, p. 251-254.

Progress made in materials, methods of manufacture, and utilization of forging dies and tools during the past 20-yr. Photographs. 7 ref.

13190* Cold Power Spinning Will Save Material and Cut Costs. Kenneth W. Stalker and K. W. Moore. *Metalworking Production*, v. 99, July 1, 1955, p. 1173-1178.

Equipment and methods for high-pressure, cold plastic deformation of metals to form hollow cones and cylinders from simple flat blanks or pre-formed shapes which can reduce cost of making some parts as much as 75% while boosting strength 15% or more. Photographs, diagrams.

Metals—Mechanical Working

13191* Trials to Adapt Metal Flow Formulas to the Roll Pass Design. **Próba przystosowanią wzorów płynięcia metalu do kalibrowania walców.** (Polish.) Z. Wusatowski and R. Wusatowski. *Prace Instytutów Ministerstwa Hutnictwa*, v. 7, nos. 2-4, 1955, p. 115-123.

Formula, applicable to alloyed steels, and under varying rolling conditions, made possible by introducing correction coefficients. Modifications of the formula are derived for calculating irregular sections. Diagrams, nomograms. 11 ref.

13192 Extruded Low Carbon Steels. R. L. Hugo. *Product Engineering*, v. 26, July 1955, p. 129-131.

Hydraulic presses extrude glass-coated billets through low-cost dies, producing complex sections with final dimensions equal to AISI cold finished bar tolerances. Current size limitations, typical applications, and properties obtainable are discussed. Photographs.

13193 Beading Techniques for Strengthening Sheet Metal Parts. Bernhard Rogge. *Product Engineering*, v. 26, July 1955, p. 183-188.

Design criteria and specifications for sheet, angle, tube, and assembly beading in steel, Al, Mg, and other common materials. Diagrams, tables.

13194 Aluminum Extrusion—From the Heavy Press Program. A. L. Hurst. *Product Engineering*, v. 26, Aug. 1955, p. 150-153.

Limitations in die design; production considerations; tolerances obtainable and applicable alloys, based on parts already produced by this equipment. Photographs, tables.

13195* Forged and Stamped Parts of Aluminum Alloys. **Les pièces forgée set metricées en alliages d'aluminium. IV.** (French.) Robert Colomb. *Revue de l'aluminium*, v. 32, no. 221, May 1955, p. 497-507.

Discusses obtaining of rounded angles, shape and depth of marks, fibering, asymmetrical pieces, protrusions, and marking of pieces. Diagrams, tables. (To be continued.)

13196* Problems of Manufacture and of Ultrasonic Control of Heavy Forging Fabricated by Crushing. **Problèmes de fabrication et de contrôle ultrasonore de grosses pièces de forge fabriquées par écrasement.** (French.) C. Roques, Ch. Dubois, and P. Bastien. *Revue de métallurgie*, v. 52, no. 5, May 1955, p. 353-368.

The nature and cause of a relatively frequent defect in forging by means of press-crashing are discussed. Ultrasonic examination appears not to allow distinguishing, without any risk of error, the cracks of some inclusions very strongly crushed, which are often localized in the same way. Tables, graphs, micrographs, photographs, diagrams. 11 ref.

13197 Large Forgings—Current German Viewpoints on Design and Production. H. Gummert. *Steel Processing*, v. 41, July 1955, p. 421-425.

Raw materials, heat treatment, working and shaping, testing procedures, and machinery for production of forgings. Tables, diagrams. 3 ref.

13198 Unusual Drop Forging of Crawler Tractor Truck Wheels. Charles E. Warner. *Steel Processing*, v. 41, July 1955, p. 433-434.

Forging of wheels from 46-lb. slugs. Slugs are heated in an oil fired furnace and forged in two operations. Photographs.

13199 Putting Machinability Data to Work. M. C. Shaw, N. H. Cook and P. A. Smith. *Tool Engineer*, v. 35, Aug. 1955, p. 81-86.

Applications to tool wear rate, finish obtained, and machining costs. Photographs, diagrams, graphs. 2 ref.

13200* Machining of Non-Rigid (Hollow) Shaft. **Obrabotka nezhestkikh valov.** (Russian.) G. S. Beliaev. *Vestnik Mashinostroeniia*, v. 35, no. 6, June 1955, p. 41-44.

Particularities in operation; adjustment of shafts on lathes; optimum machining conditions. Tables, diagrams.

13201 Cutting Applications. Steel Mill Finds Many Uses for Oxygen, Acetylene. Raymond Kopecky. *Welding Engineer*, v. 40, Aug. 1955, p. 34-36.

Illustrates production applications either as an emergency measure or as permanent modifications, usually oxy-actylene cutting. Photographs.

13202* Heavy-Duty Machining. A. B. Albrecht. *Western Machinery and Steel World*, v. 46, July 1955, p. 74-77.

The use of chip studies, tool forces, and horsepower values in selecting proper cutting speeds. Photographs, tables, graphs.

13203* Impacting Makes Western Debut at Hycon. Harry A. Kirkpatrick. *Western Metals*, v. 13, July 1955, p. 46-48.

Description of "impacting", a relatively new forging process which permits "drop forging" in mid-air. This method requires less energy, compared with other forging processes, and works stock equally from two opposing sides. Photographs.

13204 Some Bending Characteristics of Cartridge Brass, 70%, and Yellow Brass, 65%, Wire. Lewis E. Thelin and Robert O. Abbott, Jr. *Wire and Wire Products*, v. 30, July 1955, p. 763-766, 813-814.

Data presented in a form that is of value to both metallurgists and tool designers in the selection of suitable temper wire for formed parts and possibly will give an indication of the "springback", or set for use, when designing bending dies. Photographs, tables.

13205* The Ability of Zinc to Form Alloys With Tungsten and Molybdenum. **Über die Legierungsfähigkeit von Zink mit Wolfram und Molybdän.** (German.) Werner Köster and Heinz Schmid. *Zeitschrift für Metallkunde*, v. 46, no. 6, June 1955, p. 462-463.

Reaction of Zn with W and Mo in the region of 1100 to 1350 C. Tungsten-Zn and Mo-Zn systems and analysis of the component crystal structures. Micrographs. 3 ref.

See also:

12588 (repair of rolling-mill rolls)
12790 (machine tool inspection)
12791 (machine tool inspection)
13360 (rolling and wiredrawing quality control)
13361 (rolling aluminum alloys)
13362 (rolling of copper alloys)
13363 (quality control of extrusions)

METALS—METALLOGRAPHY, TRANSFORMATIONS, AND STRUCTURES

13206* Bravais' and Kossel-Stranski's Theories of Homopolar Crystals and Their Application to Elements. (English.) Gösta Wranglén. *Acta Chemica Scandinavica*, v. 9, no. 4, 1955, p. 661-676.

Correlation of lattice structure to crystal habit or external face development. Tables, diagrams. 34 ref.

13207 Application of Gibbs-Duhem Equations to Ternary Systems. (English.) R. Schuhmann, Jr. *Acta Metallurgica*, v. 3, no. 3, May 1955, p. 219-226.

A new method for calculating activities, activity coefficients and other partial molal properties for two components in a ternary system by examination of the property in the third component. The derived relations are used to calculate activities of silica, iron oxide, and O in ternary iron silicate slags. Phase diagrams. 15 ref.

13208 Influence of Grain Boundaries on the Behaviour of Carbon and Nitrogen in α-Iron. (English.) G. Lagerberg and Åke Josefsson. *Acta Metallurgica*, v. 3, no. 3, May 1955, p. 236-244.

Internal friction is related to diffusion, solubility, and precipitation in solid solutions; grain size and boundary concentrations of C and N are studied. Graphs, micrographs. 19 ref.

13209 Dislocations in Low-Angle Boundaries in Germanium. (English.) F. L. Vogel, Jr. *Acta Metallurgica*, v. 3, no. 3, May 1955, p. 245-248.

X-ray and microscopic studies show correlation between dislocation spacings in the boundary and the observed pit spacing. Graphs, diagrams, photograph, micrographs. 10 ref.

13210 Crystal Perfection in Aluminum Single Crystals. (English.) T. S. Noggle and J. S. Koehler. *Acta Metallurgica*, v. 3, no. 3, May 1955, p. 260-267.

A high resolution X-ray diffraction technique is used on annealed single crystals of Al in order to arrive at an estimate of dislocation densities and distributions. Tables, graphs, diagrams. 9 ref.

13211 The Deformation of Single Crystals of α-Brass. (English.) Heather M. Murphy and E. A. Calnan. *Acta Metallurgica*, v. 3, no. 3, May 1955, p. 268-273.

Single crystals, deformed in tension, are studied by X-ray and micrographic methods. Shows connection between the orientation dependence of cross-slip and the unequal hardening of active and latent slip planes. Tables, graphs, diagrams, micrographs. 15 ref.

13212 Determination of the Dislocation Density in Deformed Fe. **Bestimmung der Versetzungsliniendichte von verformtem Eisen.** (German.) W. Köster and L. Bangert. *Acta Metallurgica*, v. 3, no. 3, May 1955, p. 274-276.

In Fe, containing C and N, damping-temperature curves were investigated in relation to foreign atoms in solid solution and the degree of cold working. Tables, graphs. 12 ref.

13213 Structure and Polygonization of Bent Zinc Monocrystals. (English.) John J. Gilman. *Acta Metallurgica*, v. 3, no. 3, May 1955, p. 277-288.

Crystallography and distribution of dislocations in freshly bent crystals; kinetics of polygonization. Graphs, diagrams, photographs, micrographs. 27 ref.

13214 Diffusion of Radioactive Cu in Commercial Steel. **Diffusion von radioaktiven Kupfer in technischem Stahl.** (German.) R. Lindner and F. Karnik. *Acta Metallurgica*, v. 3, no. 3, May 1955, p. 297.

Study of the diffusion rate of Cu through steel in a H atmosphere as a function of temperature. Graph. 1 ref.

13215 The Origin of Screw Dislocations—Role of Colloidal Particles. (English.) G. W. Sears. *Acta Metallurgica*, v. 3, no. 3, May 1955, p. 299-300.

Compares work on CdI_2 platelets from solution and paratoluidine platelets from vapor. Mentions new work with colloidal-free CdI_2 crystals. 4 ref.

13216 Self-Diffusion of Lead in Oriented Grain-Boundaries. (English.) B. Okkerse, T. J. Tiedema, and W. G. Burgers. *Acta Metallurgica*, v. 3, no. 3, May 1955, p. 300-302.

Thorium-B activated, oriented crystal sections of Pb showed preferred diffusion by autoradiography. Graphs, diagrams. 12 ref.

13217* Recrystallization Characteristics of an Al-Mn Alloy. **Untersuchungen über das Rekristallisationsverhalten niedrig legierter Aluminium-Werkstoffe bei Warm- und Kaltverformung.** (German.) W. Rosenkranz. *Aluminium*, v. 31, nos. 7-8, July-Aug. 1955, p. 328-334.

Response of alloys containing Cr and Mn to annealing depends strongly on their structure. The effects of a 24-hr. homogenizing anneal at 600 C on the grain size of an ingot of an Al-Mn alloy have been studied. The annealed alloy recrystallizes even during hot-shaping at 550 C with coarse grain. Micrographs, photographs. 5 ref.

13218 Factors Affecting Directional Properties in Aluminum Wrought Products. Kent R. Van Horn. Paper from AMERICAN SOCIETY FOR METALS, TRANSACTIONS. v. XLVII. p. 38-76. 1955. American Society for Metals, Cleveland. (TS300 Am35t)

Rolling and recrystallization preferred orientation in Al alloy sheet; correlation of preferred orientation with directional properties. Graphs, tables, diagrams, photographs. 12 ref.

13219 The Effect of Cold Work and Recrystallization on the Formation of the Sigma Phase in Highly Stable Austenitic Stainless Steels. A. J. Lena and W. E. Curry. Paper from AMERICAN SOCIETY FOR METALS, TRANSACTIONS. v. XLVII. p. 193-210. 1955. American Society for Metals, Cleveland. (TS300 Am35t)

Cold work below a definite critical amount has little effect or may retard σ formations. Tables, graphs, micrographs. 5 ref.

13220 Austenitic Chromium-Manganese-Nickel Steels Containing Nitrogen. Russell Franks, W. O. Binder, and James Thompson. Paper from AMERICAN SOCIETY FOR METALS, TRANSACTIONS. v. XLVII. p. 231-259; disc., p. 259-266. 1955. American Society for Metals, Cleveland. (TS300 Am35t)

Steels containing 16.0 to 17.5% Cr, 3.5 to 4.5% Ni, 7.0 to 9.0% Mn, 0.00 to 0.10% C, and 0.12 to 0.18% N have stable austenitic structure with good mechanical properties. Graphs, tables. 7 ref.

13221 The Effect of Deformation on the Martensitic Transformation in Austenitic Stainless Steels. H. C. Fiedler, B. L. Averbach, and Morris Cohen. Paper from AMERICAN SOCIETY FOR METALS, TRANSACTIONS. v. XLVII. p. 267-285; disc., p. 285-290. 1955. American Society for Metals, Cleveland. (TS300 Am35t)

The M_s temperature is found to decrease markedly with increasing C content, and the isothermal formation of martensite is observed on holding at subzero temperatures. Tables, micrographs, graphs. 23 ref.

13222 Effects of Cold Work on Cementite in Steel. D. V. Wilson. Paper from AMERICAN SOCIETY FOR METALS, TRANSACTIONS. v. XLVII. p. 321-346; disc., p. 346-350. 1955. American Society for Metals, Cleveland. (TS300 Am35t)

Studies using magnetic analysis and X-ray diffraction. The observed magnetic intensity to temperature relationships demonstrate the existence of structural conditions of the carbide intermediate between that of undeformed cementite and the state produced by severe cold working. Diagram, graphs, micrographs. 17 ref.

13223 Isothermal Transformation of Austenite Under Externally Applied Tensile Stress. Subrata Bhattacharyya and George L. Kehl. Paper from AMERICAN SOCIETY FOR METALS, TRANSACTIONS. v. XLVII. p. 351-377; disc., p. 378-379. 1955. American Society for Metals, Cleveland. (TS300 Am35t)

Applied stress has marked effect on beginning and completion of austenite-bainite transformation in C and alloy steels. Tables, diagram, graphs, micrographs. 36 ref.

13224 Transformation Studies in Iron-Carbon-Titanium-Vanadium Alloys and the Distribution of Carbon Between These Elements. Moss V. Davis and W. P. Fishel. Paper from AMERICAN SOCIETY FOR METALS, TRANSACTIONS. v. XLVII. p. 605-610. 1955. American Society for Metals, Cleveland. (TS300 Am35t)

Vanadium and Ti uncombined with C gave transformation temperatures which fit the binary Fe-V diagram and the ternary Fe-V-Ti diagram. Tables, graphs. 2 ref.

13225 A Contribution to the Vanadium-Oxygen Phase Diagram. W. Rostoker and A. S. Yamamoto. Paper from AMERICAN SOCIETY FOR METALS, TRANSACTIONS. v. XLVIII. p. 1002-1017. 1955. American Society for Metals, Cleveland. (TS300 Am35t)

A partial diagram in the range 0-26 wt. % O was constructed on the basis of metallographic, X-ray diffraction, and resistometric studies. Tables, graphs, micrographs. 9 ref.

13226* Experiments on the Relationship of Technological Properties and Transformation Structures of Steel Wires. **Versuche über den Zusammenhang technologischer Eigenschaften und Umwandlungsgefüge von Stahldrähten.** (German.) Hans Schlacher, Jr. *Berg- und hüttenmännische Monatshefte der montanistischen Hochschule in Leoben*, v. 100, no. 5, May 1955, p. 166-170.

Effect of two special methods of heat treating on the mechanical properties and structures of steel wires. Graphs, micrographs, tables. 6 ref.

13227* Graphite Formation in Grey Cast Irons and Related Alloys. H. Morrogh. *British Cast Iron Research Association. Journal of Research and Development*, v. 5, June 1955, p. 655-671 + 14 plates.

Metals—Metallography, Transformations, and Structures

Formation of flake graphite; effects of S, Ti, and Mg; graphite spherulites in hypoeutectic Mg-containing irons. Photographs, micrographs, diagrams. 48 ref.

13228 The Chemical Nature of the Sigma Phase in the Iron-Chromium System. A. T. Grigor'ev, N. M. Gruzdeva, and I. A. Bondar. *Henry Brutcher Translation No.* 3454, 13 p. (Condensed from *Izvestiya Sektora Fiziko-Khimicheskogo Analiza*, v. 21, 1954, p. 132-143.) Henry Brutcher, Altadena, Calif.

Discussion of nature of σ phase in the light of hardness measurements. Correlation of results of present research with literature (chiefly Russian). Tables, diagrams, micrographs. 7 ref.

13229 Etching of Steels by Ionic Bombardment. I. N. Prilezhaeva, G. V. Spivak, and M. I. Malkina. *Henry Brutcher Translation No.* 3459, 8 p. (Abridged from *Zhurnal Technicheskoi Fiziki*, v. 24, no. 11, 1954, p. 2090-2096.) Henry Brutcher, Altadena, Calif.

Merits of ionic bombardment for revealing micro-structure as well as grain boundaries through differential coefficients of disintegration. Micrographs. 7 ref.

13230* An Electron Diffraction Study to Determine the Oxide Form Produced in Oxidized Molten Iron. Nobutaro Kayama. *Castings Research Laboratory, Reports, Waseda University*, 1955, no. 6, p. 6-8.

In the oxidized iron, SiO_2, as an inclusion, increased up to about 0.05%, although FeO did not increase more than 0.2%. The silica was present as α-crystobalite in free state, and not a component of a silicate. Tables, diffraction patterns. 2 ref.

13231* The Effect of Inoculation in Nodular Cast Iron. Ichiro Iitaka and Kokichi Nakamura. *Castings Research Laboratory, Reports, Waseda University*, 1955, no. 6, p. 9-11.

Effects of variation in inoculating time and interval on microstructure. Micrographs. 4 ref.

13232* The Effects of Mo, Ni:Mo and Cu:Mo Additions on the Matrix of Spheroidal Graphite Cast Iron. Takaji Kusakawa. *Castings Research Laboratory, Reports, Waseda University*, 1955, no. 6, p. 15-20.

Effects of melt additives on micro-structure and hardness. Tables, graphs, micrographs.

13233* The Welding Phenomena Between Solid and Molten Cast Iron. Tsunemitsu Muraki. *Castings Research Laboratory, Reports, Waseda University*, 1955, no. 6, p. 42-48.

Studies of the interaction between solid steel and molten cast iron. Tables, graphs, diagram, micrographs.

13234* Evolution of the Structure of a Modified Hot Tough 80/20 Ni-Cr Type Alloy. **Sur l'évolution de la structure d'un alliage type Ni-Cr 80/20 modifié tenace à chaud.** (French.) Jack Manenc. *Comptes rendus*, v. 240, no. 25, June 20, 1955, p. 2413-2415.

Describes appearance of "satellite rays" on Debye-Scherrer diagrams during X-ray investigation of the structure of alloy during first stages of tempering. Table. 3 ref.

13235 Position of Cu and Mg Atoms in the Structure of CuMgSn. **Polozheniia atomov medi i magniia v strukture CuMgSn.** (Russian.) E. I. Gladyshevskii and P. I. Kripiakevich. *Doklady Akademii Nauk SSSR*, v. 102, no. 4, June 1, 1955, p. 743-746.

Crystallographic study of ternary intermetallic compound CuMgSn. Tables, diagrams. 6 ref.

13236* Investigation of the Diffusion of Iron in Fe-Ni Alloys. **Issledovanie diffuzii zheleza v zhelezo-nikelevykh splavakh.** (Russian.) M. B. Nieman and A. Ia. Shiniaev. *Doklady Akademii Nauk SSSR*, v. 102, no. 5, June 11, 1955, p. 960-972.

Relation of activation energy and diffusion coefficient to alloy composition. Equations. Graphs. 12 ref.

13237 Interfaces Between Crystals. (English.) Cyril Stanley Smith. Paper from L'ETAT SOLIDE. p. 11-44; disc., p. 45-53. 1952. Institut International de Physique Solvay, Brussels. (QC125 In7.4e)

Properties of grain boundaries; variation of grain boundary energy with orientation; composition changes at single phase crystal interfaces. Micrographs, diagrams, tables, graphs. 44 ref.

13238 Resrystallization and Grain Growth in Solid Metals. (English.) W. G. Burgers. Paper from L'ÉTAT SOLIDE. p. 73-156; disc., p. 157-166. 1952. Institut International de Physique Solvay, Brussels. (QC125 In7.4e)

Structural changes taking place in metals during heat treatment, and their influence on the no., size, shape, state, or orientation of the constituent crystallites. Graphs, diagrams, micrographs. 240 ref.

13239 Recent Work on Solid State Transformations in Sweden. E. Rudberg. Paper from L'ÉTAT SOLIDE. p. 167-187; disc., p. 188-196. 1952. Institut International de Physique Solvay, Brussels. (QC125 In7.4e)

Precipitation and order-disorder changes; isothermal transformation of austenite; embryology of precipitating phases. Graphs, micrographs. 20 ref.

13240 Periodicity Defects in the Networks of Solid Solutions. **Les défauts de périodicité dans les réseaux des solutions solides.** (French.) A. Guinier. Paper from L'ÉTAT SOLIDE. p. 197-230; disc., p. 231-233. 1952. Institut International de Physique Solvay, Brussels. (QC125 In7.4e)

Applications of X-rays to the study of the disorder of structures of mixed crystals. Graphs, diagrams, tables. 38 ref.

13241 Discussion of the Theory of Dislocation. **Diskussionsbeitrag zur Theorie der Versetzungen.** (German.) U. Dehlinger. Paper from L'ÉTAT SOLIDE. p. 415-419; disc., p. 420-425. 1952. Institut International de Physique Solvay, Brussels. (QC125 In7.4e)

Critical analysis of the theory. Diagrams. 5 ref.

13242 Dislocation Models of Grain Boundaries. (English.) W. Shockley. Paper from L'ÉTAT SOLIDE. p. 431-484; disc., p. 485. 1952. Institut International de Physique Solvay, Brussels. (QC125 In7.4e)

Origin of grain boundary energy; cold work effects. Diagrams, tables, graphs. 28 ref.

13243 Diffusion, Work-Hardening, Recovery and Creep. (English.) N. F. Mott. Paper from L'ÉTAT SOLIDE. p. 515-534. 1952. Institut International de Physique Solvay, Brussels. (QC125 In7.4e)

Review of theories; sources of dislocation rings; origin of cross slip; Kirkendall effect. Diagrams. 30 ref.

13244* Effect of TaC and NbC Additions on Properties of Sintered Carbides. **Vliv přísad karbidu tantalu a karbidu niobu na vlastnosti slinutých karbidů.** (Czech.) Curt Agte and Vladimír Dufek. *Hutnické Listy*, v. 10, no. 6, June 1955, p. 322-329.

Effect of small additions upon properties of WC-Co and WC–TiC-Co systems. Grain refining effect of low additions (up to 2%) to the WC-Co system and increase of hardness are indicated. Tables, graphs, micrographs. 18 ref.

13245 The Equilibrium Diagram of the System Nickel-Titanium. D. M. Poole and W. Hume-Rothery. *Institute of Metals, Journal*, v. 83, July 1955, p. 473-480.

Investigation of the system above 900 C by thermal, microscopical, and X-ray methods. Tables, diagrams. 18 ref.

13246 The Solid Solubility of Chromium Carbide, Cr_3C_2, in Titanium Carbide. A. Carter. *Institute of Metals, Journal*, v. 83, July 1955, p. 481-484.

Accurate determinations of the solid solubility by X-ray diffraction and metallographic techniques, over the temperature range 1250 to 1900 C, are reported. Diagrams. 10 ref.

13247 A Study of the Titanium-Germanium System in the Region 0-11 Atomic Per Cent Germanium. M. K. McQuillan. *Institute of Metals, Journal*, v. 83, July 1955, p. 485-489 + 1 plate.

Germanium is found to cause a slight elevation of the transformation temperature of Ti, a peritectoid reaction in which β-Ti reacts with Ti_5Ge_3 to form α-Ti occurring at approximately 897 C. Table, micrographs, graphs. 7 ref.

13248 Equilibrium Relations at 460°C. in Aluminium-Rich Alloys Containing 0-7% Copper, 0-7% Magnesium, and 2.0% Silicon. H. J. Axon. *Institute of Metals, Journal*, v. 83, July 1955, p. 490-492.

Additional information about the 2.0% Si section and considers the reliability with which a solid model of the Al-rich corner of the quaternary isothermal model may be constructed. Diagrams, table. 3 ref.

13249 Thermodynamics of Carbon Dissolved in Iron Alloys. IV. Solubility of Carbon in Fe-Si-P Melts. E. T. Turkdogan and L. E. Leake. *Iron and Steel Institute, Journal*, v. 180, July 1955, p. 269-271.

Investigation of the influence of Si on the solubility of graphite in Fe-P melts within the temperature and composition range encountered in the process of ironmaking. Graphs, table. 3 ref.

13250* The Effect of Tempering on the Structure and Properties of a Hardened 13 Per Cent Chromium Steel. **Anlöpningens inverkan på strukturen och egenskaperna hos härdat 13% kromstål.** (Swedish.) Sakari Heiskanen. *Jernkontorets Annaler*, v. 139, no. 6, 1955, p. 361-411.

Carbide reactions on tempering; investigation of carbides by light and electron microscope and by X-ray diffraction. Low corrosion resistance at certain stage of tempering explained by formation of local cells, principally due to difference in Cr content, between carbide ferrite contact surface and the rest of the ferrite. Graphs, tables, micrographs. 28 ref.

13251 Study of the Kinetics of Ordering in the Alloy AuCu. G. C. Kuczynski, R. F. Hochman, and M. Doyama. *Journal of Applied Physics*, v. 26, July 1955, p. 871-878.

Kinetics of ordering was investigated by measuring the change of electrical resistivity as a function of time during isothermal ordering, after various disordering heat treatments. Graphs, micrographs, table. 16 ref.

13252 Thermionic Emission Microscopy of Metals. II. Transformations in Plain Carbon Steels. R. D. Heidenreich. *Journal of Applied Physics*, v. 26, July 1955, p. 879-889.

Direct observation of transformations at temperatures above 625 C is demonstrated for both the A_3 and A_1 transformations. Graphs, micrographs. 11 ref.

13253 Relation of Flake Formation in Steel to Hydrogen, Microstructure, and Stress. A. W. Dana, Jr., F. J. Shortsleeve, and A. R. Troiano. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Aug. 1955, p. 895-904.

Transformation characteristics of austenite in a particular section play a major role in the occurrence of flakes. Isothermal and continuous cooling studies demonstrated that flake formation is particularly sensitive to nature, distribution, and relative proportions of the microconstituents in the cooled sections. Tables, micrographs, graphs.

13254 Kinetics of the Superconducting Phase Transition. T. E. Faber. Paper from LOW-TEMPERATURE PHYSICS. National Bureau of Standards Circular 519. p. 47-50. 1952. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (QC278 Un3.5L)

Results of experiments to determine what governs the field strength at which growth is just able to start and in what direction and how fast it proceeds. Graphs.

13255 Recovery and Recrystallization of Cold-Worked Beryllium. G. L. Tuer, D. H. Woodard, D. B. Lister, and A. R. Kaufmann. Paper from THE METAL BERYLLIUM. p. 466-504. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Data on the effect of annealing on mechanical properties and electrical resistivity; metallographic observations on thermally treated specimens; information on the effect of recovery on X-ray line shapes in Be. Graphs, tables, diagrams, micrographs, photographs. 26 ref.

13256 Metallography of Beryllium and Beryllium-Rich Alloys. Murray C. Udy. Paper from THE METAL BERYLLIUM. p. 505-529. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Development and modification of various techniques used in the microscopic examination of the metals. A generally useful scheme is presented and the procedures of individual laboratories are compared in tabular form. Tables, micrographs. 15 ref.

13257* Preparing Metallic Monocrystals. **Preparazione di monocristalli metallici.** (Italian.) A. Ferri. *Metallurgia italiana*, v. 47, no. 6, June 1955, p. 251-258.

A bibliographic survey of four different methods; equipment and method for making Zn, Cu, and Si monocrystals. Graphs, diagrams, photographs. 15 ref.

13258 Effect of Cobalt on Diffusion of Carbon. (Digest of "Influence of Cobalt on the Diffusion of Carbon in Iron-Carbon Alloys", by V. A. Yurkov and M. A. Krishtal; *Doklady Akademii Nauk SSSR*, v. 92, 1953, p. 1171-1173.) *Metal Progress*, v. 68, July 1955, p. 148, 150.

Results of experiments on the rate of decarburization of iron-C-Co alloys; diffusion of C in Fe is impeded by 1 and 4% Co content.

13259 Self-Diffusion of Fe in the Fe-Ni System. (Digest of "Influence of Carbon on the Self-Diffusion of Iron in the Iron-Nickel System", by P. L. Gruzin and E. V. Kuznetsov; *Doklady Akademii Nauk SSSR*, v. 93, p. 809-812.) *Metal Progress*, v. 68, Aug. 1, 1955, p. 176, 178.

Carbon decreases the binding of Fe to the iron-Ni solid solution and this effect is smaller the higher the Ni content of the alloy.

13260 Growth of Graphite Nodules. (Digest of "The Form of Nodules of Temper Carbon in Magnesium Cast Irons", by K. P. Bunin and A. V. Chernovol; *Doklady Akademii Nauk SSSR*, v. 95, 1954, p. 785.) *Metal Progress*, v. 68, Aug. 1, 1955, p. 180, 182.

The course of graphitization was followed by examining specimens that were removed at appropriate times from the annealing furnace and air cooled. The microstructures were observed under polarized light, to show the direction of growth of the radial crystallites that composed each nodule.

13261 Fields Around Impurity Atoms in Metals. L. C. R. Alfred and N. H. March. *Philosophical Magazine*, v. 46, 7th ser., no. 378, July 1955, p. 759-768.

Calculations of the potential around atoms with valency $Z + 1$ dissolved in a monovalent metal. Graphs. 5 ref.

13262* On the Mechanism of Aging in Aluminium-Silver Alloys. III. Variation of the Young's Modulus. (English.) Kayako Tanaka, Hidetaro Abe, and Ken-ichi Hirano. *Physical Society of Japan, Journal*, v. 10, no. 6, June 1955, p. 454-458.

Investigation to obtain the isothermal aging and heating curves of the Young's modulus on various age-hardening alloys, such as Al-Ag, Al-Cu, Al-Zn, Al-Mg-Zn, as well as some Cu base alloys. Diagram, graphs. 22 ref.

13263* On Producing Thin Single Crystal Foils of Aluminium Which Have Any Desired Crystallographic Orientations. (English.) Hiroshi Fujiwara and Takao Ichiki. *Physical Society of Japan, Journal*, v. 10, no. 6, June 1955, p. 468-471.

Method of producing Al foils (0.06x5x100 mm^3., 99.53% in purity) having definite crystallographic orientations. Photographs, diagrams. 6 ref.

13264* Problems of the McQuaid Test and of Austenite Grain Growth. **Zagadnienia próby Mc Quaida i rozrostu ziarna austenitu.** (Polish.) St. Orzechowski. *Prace Instytutów Ministerstwa Hutnictwa*, v. 7, nos. 2-4, 1955, p. 164-178 + 8 plates.

It is shown that in fine-grain steels the McQuaid grain may vary during treatment, and the tendency of austenite grain to grow may increase under certain hot working conditions or as a result of heat treatment. Conditions favoring the coarsening of grains and heat treatment necessary, to re-establish original fine grain, are determined. Micrographs, tables, graphs. 35 ref.

13265* The Textures of Lamination and of Recrystallization of Extra Soft Sheet Steel. **Étude des textures de laminage et de recristallisation des tôles d'acier extra-doux.** (French.) G. Pomey and Ch. Crussard. *Revue de métallurgie*, v. 52, no. 5, May 1955, p. 401-416; disc., p. 416-417.

Metals—Metallography, Transformations, and Structures

Use of an X-ray diffraction chamber, for studying the textures of the sheet, identifies crystalline orientations developed during hot and cold rolling, and subsequent annealing. Photographs, diagrams, tables. 26 ref.

13266* Successions of Precipitations and the Structural Hardening in Al-Cu 4% Alloys. **Les séquences de précipitation et le durcissement structural des alliages Al-Cu 4%.** (French.) A. Saulnier. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 21, no. 6, June 1955, p. 178-182.

Electron-microscopic investigation shows presence of successive precipitations on sub-microscopic level during heat treatment and aging. Micrographs. 5 ref.

13267 On the Formation of Dislocation Networks in Some Crystal Lattices. (English.) Francisco Eiichi Fujita. *Science Reports of the Research Institutes, Tōhoku University*, ser. A, v. 7, no. 1, Feb. 1955, p. 50-55.

Growth and mutual connection of the dislocation rings and the eventual formation of networks are geometrically discussed in reference to a face-centered cubic lattice. Diagrams, tables. 6 ref.

13268* The Light-Figure Phenomenon Revealed and Crystal Planes Developed by Etching in Tetragonal Tin Crystals and the Determination of Their Crystal Orientations by the Light-Figure Method. I. The Light-Figure Phenomenon Revealed and Crystal Planes Developed by Etching. II. Orientation Determination by Light Figures. (English.) Mikio Yamamoto and Jirō Watanabe. *Science Reports of the Research Institutes, Tōhoku University*, ser. A, v. 7, no. 2, Apr. 1955, p. 145-172.

The light figures revealed by and crystal planes developed in single crystals of tetragonal Sn, etched with various concentrated aqueous solutions of acids, alkalis, or salts for various time-intervals, were studied and the suitability of observed light figures for the orientation determination was examined. Application of light figures to the orientation determination of single crystal rods of tetragonal Sn was worked out. Tables, diagrams, photographs. 23 ref.

13269* Further Studies on the Orientation Determination of Cubic Metal Crystals Rods by the Light-Figure Method. (English.) Mikio Yamamoto and Jirō Watanabe. *Science Reports of the Research Institutes, Tōhoku University*, ser. A, v. 7, no. 2, Apr. 1955, p. 173-183.

Factors affecting the precision, accurately determinable ranges of orientation angles, and kind and number of applicable light figures or of accurately determinable angles are fully explained. Tables, diagrams. 9 ref.

13270* Electron Diffraction Study on Titanium Attacked by Various Acids. (English.) Shiro Ogawa and Denjiro Watanabe. *Science Reports of the Research Institutes, Tōhoku University*, ser. A, v. 7, no. 2, Apr. 1955, p. 184-193.

Titanium surfaces attacked by HF, HCl, H_2SO_4, H_3PO_4, HNO_3, aqua regia, H_2CrO_4, NaCl solution or $FeCl_3$ solution were examined by the reflection method. Tables, diagrams, photographs. 8 ref.

13271* Slow Motion of Dislocation in Face-Centered Cubic Crystals. (English.) Hideji Suzuki. *Science Reports of the Research Institutes, Tōhoku University*, ser. A, v. 7, no. 2, Apr. 1955, p. 194-203.

Calculation of the mechanism of micro-creep on the basis of the chemical interaction mechanism. Diagrams, graphs. 10 ref.

13272* Graphite Shape in Spheroidal Cast Iron. **Tvar grafitu v tvárné litině.** (Czech.) Marie Králová and Jiří Klaban. *Slévárenství*, v. 3, no. 7; *Práce Československého Výzkumu Slévárenského*, v. 2, no. 20, July 1955, p. 27-30.

Graphite shape, reconstructed by a series of metallographic sections, precipitated in forms not corresponding to a crystallographic form. Description of precipitation of particles in different positions of graphitic grain section is given. Micrographs, diagrams. 11 ref.

13273* Prevention of the Formation of Martensite on Torch Cuts. **Verhinderung von Martensitbildung an Brennschnitten.** (German.) Fritz Dechner and Hermann Speich. *Stahl und Eisen*, v. 75, no. 14, July 14, 1955, p. 912-913.

Flame cutting tests on 6 to 30 mm. thick plates of steels St 37, St 50, St 52, and St. 70; effects of plate thickness, feed rate, and the steel type on the prevention of hardening phenomena; arrangement of the annealing torch. Table, graphs. 2 ref.

13274 The Solubility of Beryllium in Liquid Gallium, Tin and Indium, and the Phase Diagrams of Beryllium With These Metals. Reed O. Elliott and Eugene M. Cramer. *U. S. Atomic Energy Commission, AECU-3022*, 1952, 10 p. (UF767 U3au)

Determined between 540 and 1200 C. All three diagrams are characterized by a wide miscibility gap in the liquid state, an absence of intermediate phases, and no detectable solid-state solubility. A monotectic was found in the Be-Ga system. No evidence for a eutectic was found in any of the systems. Tables, graphs, micrographs. 4 ref.

13275* Calculation of the Diffusion Rate of Hydrogen Through a Nickel Plate. **Calcul de la vitesse de diffusion de l'hydrogène à travers une lame de nickel.** (French.) E. Thomas. *Vide*, v. 10, no. 57, May-June 1955, p. 71-77.

C. J. Smithell's formula applied to a 1 mm. plate from 700 to 1500 K at various pressures. Tables, graphs. 5 ref.

13276* Hydrogen Porosity in Metals With Special Consideration of Aluminum and Its Alloys. **Wasserstoff-Porosität in Metallen unter besonderer Berücksichtigung des Aluminiums und seiner Legierungen.** (German.) C. E. Ransley and D. E. J. Talbot. *Zeitschrift für Metallkunde*, v. 46, no. 5, May 1955, p. 328-337.

Determination of H content in Al and its alloys; diffusion of H in Al, Cu, and Ni as a function of temperature; solubility of H in Al and its alloys; determination of porosity, and mechanism of pore formation. Graphs, tables, diagrams. 8 ref.

13277* Formation of Binary and Complex Systems of B-Metals. **Aufbau dr Zwei- und Mehrstoffsysteme der B-Metalle. I.** The System of Gallium with B-Metals. **Die Systeme des Galliums mit den B-Metallen.** (German.) Heinz Spengler. *Zeitschrift für Metallkunde*, v. 46, no. 6, June 1955, p. 464-467.

Gallium-Tl system; binary, ternary, quaternary, and polynary systems of Ga with B-metals. Tables, diagrams. 10 ref.

13278* Constitutional Diagram of Beta-Phase in the Cobalt-Zinc System. **Das Zustandsbild der Beta-Phase im System Kobalt-Zink.** (German.) Werner Köster and Heinz Schmid. *Zeitschrift für Metallkunde*, v. 46, no. 6, June 1955, p. 468-469.

Magnetometric determination of saturation curve of the β_1 phase for Co. Table, phase diagram, micrograph. 2 ref.

13279* Grain Refining of Aluminum. **Beitrag zur Kornfeinung von Aluminium.** (German.) Wolfgang Thury. *Zeitschrift für Metallkunde*, v. 46, no. 7, July 1955, p. 448-490.

Nucleation influence of TiC, AlB_2, and TiB_2 on pure Al and its alloys. Tables. 7 ref.

13280* Sharp and Diffused X-Ray Interference in the Case of Age Hardening. **Scharfe und diffuse Röntgenstrahlinterferenzen bei der Alterungshärtung.** (German.) Heinz Jagodzinski. *Zeitschrift für Metallkunde*, v. 46, no. 7, July 1955, p. 491-499.

Computation of diffused interference by integration into particle dispersion and interaction terms. Discussion of other computation methods. Diagrams. 14 ref.

13281* Gold-Patinum-Palladium Alloys. **Die Gold-Platin-Palladium-Legierungen.** (German.) Ernst Raub and Georg Wörwag. *Zeitschrift für Metallkunde*, v. 46, no. 7, July 1955, p. 513-515.

X-ray investigation of the Au-Pd-Pt ternary system and some of the binary alloys, Au-Pt and Pt-Pd. Tables, graphs, phase diagrams. 4 ref.

13282* Behavior and Diffusion of Sulfur in Nickel. **Über das Verahlten und die Diffusion von Schwefel in Nickel.** (German.) Irmtraud Pfeiffer. *Zeitschrift für Metallkunde*, v. 46, no. 7, July 1955, p. 516-520.

Sulfur content and brittleness of Ni; determination of diffusion coefficient of S at 1000, 1100, and 1200 C and the activation energy of the process. Tables, graphs, micrographs. 8 ref.

13283* Diffusion of Sb, As, and In in Solid Ge. **Diffusion von Antimon, Arsen und Indium in festem Germanium.** (German.) W. Bösenberg. *Zeitschrift für Naturforschung*, v. 10a, no. 4, Apr. 1955, p. 285-291.

Electrical measurement of concentration of impurities added to the molten Ge or by diffusion of vapor-deposited films into the Ge monocrystals; determination of diffusion coefficients and of effect of Sb, As, and In or semiconducting properties of Ge. Tables, diagram, graphs. 25 ref.

See also:

12608 (vapor deposited coatings)
13084 (recrystallization of tin)

METALS—POWDER

13284 New Presses for Metal-Powder Products. S. L. Zlotnikov and L. G. Brodskii. *Henry Brutcher Translation No.* 3451, 9 p. (From *Vestnik Mashinostroeniya*, v. 34, no. 7, 1954, p. 18-22.) Henry Brutcher, Altadena, Calif.

Description of three types of automatic press for compacting metal powders and buffering systems to control compacting pressure and prevent over-loading of the presses owing to variations in the nature of the material being pressed. Table, diagrams, graphs, photographs.

13285 Some Studies of Al-Cu and Al-Zr Solid State Bonding. Samuel Storchheim. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Aug. 1955, p. 891-894.

Studied as a function of temperature, pressure, and time at pressure, it is shown that good bonds were obtainable with Cu, while excellent bonds were attained with Zr. With this system, it is possible to develop bond strengths between the two metals which are greater than Al itself. Diagram, graphs, micrographs, photograph. 1 ref.

13286 Small Volume Production of Metal Powder Parts. B. I. Horton. *Materials & Methods*, v. 42, July 1955, p. 92-93.

Type of parts produced and the savings that have resulted from using powder metal parts. Photographs.

13287 Fabrication of Beryllium by Powder Metallurgy. Wallace W. Beaver. Paper from THE METAL BERYLLIUM. p. 152-201. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Production, consolidation, and fabrication of powders, and properties of resulting products. Graphs, diagrams, tables, micrographs, photographs. 20 ref.

13288 Research and Development in Beryllium Powder Metallurgy. Henry H. Hausner and Norman P. Pinto. Paper from THE METAL BERYLLIUM. p. 202-240. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Theory; room temperature compacting; mechanical and thermal treatment of compacts; cold press sintering and pressing at elevated temperatures. Graphs, tables, micrographs, graphs. 19 ref.

13289* Change in Dimension of Iron-Copper Sintered Alloys. **Massänderungen bei Eisen-Kupfer-Sinterlegierungen.** (German.) E. Pelzel. *Metall*, v. 9, nos. 13-14, July 1955, p. 565-569.

Possible causes of shrinkage and growth; selection of iron powder and Cu or Cu alloy powder; wt. losses and shrinkage; mechanical properties of finished products. Tables, graphs, micrograph. 15 ref.

13290* Modern Methods for Hard Alloys Production. **Procédés modernes d'élaboration des alliages durs.** (French.) R. Bernard. *Metallurgia italiana*, v. 47, no. 6, June 1955, p. 245-250.

Manufacture of 94% WC-6% Co alloy and development of modern alloys with abrasion-, cratering-, and shock-resistant properties. Tables, graphs, micrographs.

13291 High Strength Steel Parts—By New Powder Metallurgy Process. John W. Young. *Metal Progress*, v. 68, July 1955, p. 110-113.

Manufacture of steel parts from metal powders with high density and a combination of hardness, strength, and ductility approaching that of wrought material of the same alloy and C content. Graphs, diagrams, micrographs.

13292 Applications of Powder Metallurgy. *Metal Progress*, v. 68, Aug. 1, 1955, p. 97-99.

Highlights from five papers presented at the Western Metal Congress in Mar. 1955. Application of carbides; sintered Al powder; structural components; high temperature brazing.

13293 Properties and Uses of Sintered Aluminium. R. Irmann. *Metal Treatment and Drop Forging*, v. 22, June 1955, p. 245-250.

Review of the properties and potentialities of sintered Al powder; possible uses are discussed. Micrographs, graphs, tables, photographs, diagrams. 22 ref.

13294* Investigations of Metal Powder Production. **Otrzymywanie proszków metali.** (Polish.) W. Rutkowski. *Prace Instytutów Ministerstwa Hutnictwa*, v. 7, nos. 2-4, 1955, p. 141-147.

Electrolytic and chemical methods of preparing Fe, Cu, Sn, Co, and Ni powders. Analysis of physical and chemical properties to determine suitability for producing articles. Tables, graphs, micrographs, diagram. 19 ref.

13295* Magnetic Analysis of Sintered Cu-Ni Parts. **Zur magnetischen Analyse von Kupfer-Nickel-Sinterkörpern.** (German.) Karl Torkar and Helmut Götz. *Zeitschrift für Metallkunde*, v. 46, no. 5, May 1955, p. 371-377.

New, accurate, magnetic scale for determining the effect of composition of solid Cu-Ni solutions on saturation, magnetization, and Curie temperature, and for quantitative investigation of the sintering process. Diagrams, graphs, tables. 10 ref.

MINING ENGINEERING

13296* Turbine Drilling Under Complex Conditions. **O turbinnom burenii v oslozhnennykh usloviiakh.** (Russian.) A. V. Kol'chenko. *Neftianoe Khoziaistvo*, v. 33, no. 7, July 1955, p. 26-32.

Abrasive properties of drilling muds and their effect on the surfaces of turbine pump blades. Graphs, tables, diagrams, photograph.

13297* Method of Tagged Atoms for the Investigation and Control of the Technical Condition of Oil and Gas Wells. **Metod mechenykh atomov dlia issledovanii i kontrolia tekhnicheskogo sostoianiia neftianykh i gazovykh skvazhin.** (Russian.) S. F. Vybornykh. *Neftianoe Khoziaistvo*, v. 33, no. 7, July 1955, p. 61-64.

Use of radioisotopes for determining flow of liquid between formations and the well, locating fractures, and other purposes. Graphs, diagrams.

13298* Elements of Fluid Mechanics in Porous Media. **Éléments de mécanique des fluides dans les milieux poreux. II.** Study of Linear Flow. **Études des écoulements linéaires.** (French.) A. Houpeurt. *Revue de l'institut français du pétrole et Annales des combustibles liquides*, v. 10, no. 7, July 1955, p. 730-750.

Study of linear flow; application of Fourier series to the solution of the problem; infinite and semi-infinite media. (To be continued.) Table, diagrams.

NONDESTRUCTIVE TESTING

13299* Super-Position of Diffraction Spots on Radiographs. **Überlagerungsinterferenzen bei Röntgen-Grobstrukturprüfungen.** (German.) F. Ebert and H. G. Diercks. *Aluminium*, v. 31, nos. 7-8, July-Aug. 1955, p. 335-337.

Diffraction spots from X-ray flow analysis of light metals can be identified by this rapid displacement when the specimen is touched. Diagrams, photograph, radiographs.

Nondestructive Testing

13300* Echo-Impulse Method Very Suitable for the Investigation of Difficult Materials. **Echo-impulsmethode zeer geschikt bij onderzoek van zware werkstukken.** (Dutch.) T. van der Klis. *Bedrijf en Techniek*, v. 10, no. 228; *Electronica section*, v. 8, no. 175, May 21, 1955, p. 81-83.

Principle and design of testing device; its use in detecting defects and measuring thicknesses. Diagrams, photograph.

13301 Use of Spectroanalysis in the Rapid Control Laboratory of a Steel Works. G. Hartleif and H. Kornfeld. *Henry Brutcher Translation No.* 3458, 12 p. (Abridged from *Stahl und Eisen*, v. 75, no. 9, 1955, p. 587-590.) Henry Brutcher, Altadena, Calif.

Adaptation of high-speed spectro-analytical procedures for Al, Cr, Cu, Cb, Mo, Si, Ni, and V to the equipment normally available in German routine-analysis rapid-control laboratories. Tables, graphs, diagram. 5 ref.

13302* Application of Ultrasonic Flaw Detection Method for Cast Iron (Fatigue Test). Hiroshi Yamanouchi and Takeshi Inukai. *Castings Research Laboratory, Reports, Waseda University*, 1955, no. 6, p. 55-57.

Tracing of crack propagation and ultrasonic attenuation in cast iron under repeated stress (rotating beam fatigue test). Graphs, echo patterns.

13303* Study of the Weight of Sheets. **Etude sur le poids des tôles.** (French.) Jolin. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques*, v. 12, no. 5, 1955, p. 1031-1043.

Determination of the wt. variation of a sheet or batch of sheets in relation to the theoretical wt. corresponding to the nominal thickness. Graphs, tables.

13304 The Wear on Fixed Gauges and Means to Lessen or Eliminate Its Influence. Hilding Törnebohm. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. I. p. 29-33; disc., p. 55-59. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Cost factors of wear tolerances of gages for grinding operations. Graph. 2 ref.

13305 Inspection of Prismatic Bodies by Means of an Optical Section and Application of This Method to Turbine Blades. Jacques Turrettini. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. I. p. 61-71. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Use of optical profile projectors. Diagrams, photographs. 1 ref.

13306 Methods and Instruments for Thread Gauge Inspection. C. A. LeBourhis. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. I. p. 81-95; disc., p. 108-109. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Comparison of efficiencies of various measuring machines. Photographs, diagrams. 1 ref.

13307 Methods and Equipment of the Physikalisch-Technische Bundesanstalt for the Inspection of Thread Taper Gauges. K. Bürger and M. Gary. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. I. p. 97-107; disc., p. 108-109. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Comparison of various gages; gage inspection procedures. Diagrams, photographs. 14 ref.

13308 The Possibilities of Measuring Devices for Reducing Dispersion Factors. R. Yribarren. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. I. p. 165-177; disc., p. 178. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Analysis of machine-tool errors and gaging systems to counteract them. Diagrams.

13309 High-Speed Inspection of Turbine and Compressor Blades. J. Loxham. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. I. p. 179-190; disc., p. 190-191. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Description and operation of semi-automatic equipment. Diagrams, photographs, tables. 1 ref.

13310 A Review of Pneumatic Dimensional Gauges. Louis Polk. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. I. p. 205-223; disc., p. 280-287. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Theory and operation of equipment for measuring dimensions in terms of the variations of pressure or flow in a pneumatic circuit. Diagrams, photographs. 26 ref.

13311 The Pneumatic Method Applied to Dynamic Measurements. R. Yribarren. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. I. p. 225-240; disc., p. 280-287. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Response characteristics and applications of pneumatic gages; examples of equipment for dynamic measurements. Diagrams, graphs, photographs, table.

13312 A Pneumatic Gauging Method for Proving Rings. Kurt Hild. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. I. p. 241-245; disc., p. 280-287. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Equipment and methods for measuring elastic deformation as a measure of effective force. Diagrams, photographs, graphs.

13313 Machine Tool Metrology. D. F. Galloway. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. I. p. 289-297; disc., p. 298-301. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Equipment and methods for checking machine-tool alignments and fundamental movements. Photographs, diagrams, graph.

13314 Recent Developments in Gear Metrology. C. Timms. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. II. p. 349-358; disc., p. 404-413. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Equipment and methods for measuring tooth profile and spacing errors, and alignment. Photographs, tables, graphs, diagram.

13315 A New Method for Checking the Profile of Large Marine Propellers. P. W. Harrison and H. C. Gárlick. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. II. p. 577-582; disc., p. 583-588. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Measuring techniques for determining accuracy of form of ship propellers. Diagrams, photographs, table, graph.

13316 Microgeometric Testing of Surfaces. A. Mirau. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. II. p. 589-598; disc., p. 651-644. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Describes some of the methods used in France for testing the finish of surfaces by interferometric, pneumatic, and optical methods. Diagrams, photographs, micrographs, graph.

13317 Ultrasonic Test Detects Enlarged Grains in Some Steel Parts. R. N. Hafemeister. *Iron Age*, v. 176, July 21, 1955, p. 95-97.

Nondestructive ultrasonic testing can detect grossly coarsened grain structure in some finish machined steel parts. Such coarsening, often a result of overheating in heat treatment, can be a factor in service failure. Photographs, micrographs, table.

13318 Non-Destructive Testing. I. Surface Condition. II. Ultrasonic Testing. J. M. McLeod. *Iron & Steel*, v. 28, June 1955, p. 301-306, 318; July 1955, p. 339-343.

Surface hardness and the detection of surface flaws by the penetrating liquid methods and magnetic particle tests. Importance of shape and orientation of the flaw, grain size, single and double crystal method, and surface condition; the use of shear waves, immersed scanning, shadowgraph, and resonance methods. 133 ref.

13319 Some Optical Considerations in the Design of a Polariscope & in Photoelastic Stress Analysis. V. Cadambe and R. K. Kaul. *Journal of Scientific & Industrial Research*, v. 14, sec. B, Feb. 1955, p. 41-50.

The optical design of a polariscope; steps required in the measurement of fringe orders; errors and methods for their determination. Photographs, diagrams, circuit diagram. 8 ref.

13320 Magnetic Measurement of the Hardness of Metals. D. Hadfield. *Metal Treatment and Drop Forging*, v. 22, June 1955, p. 239-244.

Development of portable instrument for big-end steel bushes in motorcycle engines and the results obtained are discussed. Photograph, table, diagram, graphs. 94 ref.

13321* Magnetic Methods of Testing Hard and Soft Magnetic Materials. **Magnetyczne metody badań materiałów magnetycznie miękkich i twardych.** (Polish.) L. Kozłowski. *Prace Instytutów Ministerstwa Hutnictwa*, v. 7, nos. 2-4, 1955, p. 209-214.

Principles and design of the hysteresis tester for determining magnetic hysteresis loop and of demagnetization curve of materials for permanent magnets; types of coercimeters for rapid measurement of the coercive force of magnetization; design of magnetometer for examining magnetic anisotorpy and of the texture of cold rolled ferromagnetic strips.

13322* The Two-Color Pyrometer. **Le pyromètre à deux couleurs.** (French.) P. Rodicq and G. Maillot. *Revue de métallurgie*, v. 52, no. 6, June 1955, p. 477-484.

A short historical review of the manner in which the study was conducted indicates the reliability of the apparatus, and gives results obtained. Diagrams, photographs, graphs.

13323* The Betatron in Industrial X-Ray Inspection. **Il betatrone utilizzato nella radiografia industriale.** (Italian.) Bartolomeo Bellion and Carlo Tribuno. *Ricerca scientifica*, v. 25, no. 6, June 1955, p. 1400-1414.

Use and advantages of 31 m.e.v. betatron operating in Turin, Italy. Radiographs, table, photographs, graphs. 12 ref.

13324* Controlling the Quality of Radiographic Images in the Examination of Welds. **Le contrôle de la qualité des images radiographiques dans l'examen des soudures.** (French.) C. Brachet. *Soudage et Techniques connexes*, v. 9, nos. 5-6, May-June 1955, p. 131-139; disc., p. 139-140.

Presents results of comparative tests conducted on different types of penetrometers. Diagrams, table, radiographs.

13325* Magnetographic Method of Controlling the Quality of Welded Joints. **Magnitograficheskii metod kontrolia kachestva svarnykh soedinenii.** (Russian.) A. S. Fal'kevich, F. I. Kisliuk, Iu. V. Usenko, and V. M. Lubov. *Svarochnoe Proizvodstvo*, 1955, no. 7, July, p. 10-12.

Description and operation of equipment for detection of defects. Photographs, diagrams, graphs.

Books and Miscellaneous Publications

13326 Engineering Dimensional Metrology. v. I - II. 689 p. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Thirty-nine papers which were presented at a symposium at the National Physical Laboratory, Teddington, England, from Oct. 21-24, 1953. Pertinent papers are separately abstracted.

See also:

12709 (size measuring equipment)
13166 (machine tool inspection)
13196 (ultrasonic control in forging)

NUCLEAR PHYSICS, NUCLEONICS, AND RADIATION

13327 Effects of Ionizing Radiation on Choline Chloride and Its Analogs. Richard M. Lemmon, Margaret A. Parsons, and Doris M. Chin. *American Chemical Society, Journal*, v. 77, Aug. 5, 1955, p. 4139-4142.

Includes tables. 16 ref.

13328 Absolute Assay of Beta Radioactivity in Thick Solids. Application to Naturally Radioactive Potassium. Andrew D. Suttle, Jr. and W. F. Libby. *Analytical Chemistry*, v. 27, June 1955, p. 921-927.

Numerous β-emitters show exponential absorption when elements are in close cylindrical geometry. Tables, graphs. 11 ref.

13329 Basic Problems in the Processing of Nuclear Fuels. III. A. M. Aikin. *Chemistry in Canada*, v. 7, July 1955, p. 44-46, 48.

In the processing of irradiated nuclear fuels, an attempt is made to answer the questions of what must be processed and in what manner, why process it, and disposition of the wastes. Graphs.

13330* New Method of Studying Radioactive Phenomena: Cinenucleography. Application to Measuring the Period of Radium C'. **Sur une méthode nouvelle d'étude des phénomènes radioactifs: La cinénucléographie. Application à la mesure de la période du radium C'.** (French.) Marcel Laporte. *Comptes rendus*, v. 240, no. 21, May 23, 1955, p. 2069-2071.

1 ref.

13331* Ionizing Particles From an Active Deposit of Ac Recorded by Photographic Emulsions. **Particules ionisantes issues du dépôt actif de l'actinium et enregistrées par des émulsions photographiques.** (French.) Marie Ader. *Comptes rendus*, v. 240, no. 22, June 1, 1955, p. 2138-2140.

Includes photographs. 3 ref.

13332* Diffusion of Co^{60} Gamma Rays by the Electric Field of the Nuclei. **Diffusion des rayons γ du ^{60}Co par le champ électrique des noyaux.** (French.) Philippe Eberhard and Lazare Goldzahl. *Comptes rendus*, v. 240, no. 24, June 13, 1955, p. 2304-2306.

The effective sections of coherent diffusion of γ-rays of Co^{60} in Pb, U, and Sn are given. Table, graphs. 6 ref.

13333* The 1-Million-Volt Particle Accelerator of Lyons, Used as a Neutron Generator. **L'accélérateur de particules à 1 million de volts de Lyon, utilisé en générateur de neutrons.** (French.) Pierre Leuba, Raymond Salin, Jean Thibaud, and Pierre Verzaux. *Comptes rendus*, v. 240, no. 24, June 13, 1955, p. 2308-2310.

Results of study of nuclear transmutations by feeding the ionic source with heavy H; yield of the accelerator. Graph. 3 ref.

13334* An Abnormal β-Radiation of Metallic Uranium. **Sur un rayonnement β anormal de l'uranium métallique.** (French.) Georges Vacca and Louis Perreau. *Comptes rendus*, v. 240, no. 25, June 20, 1955, p. 2404-2405.

Discusses surface concentration phenomenon of β-activity noted after heat treatment of U.

13335 The Significance of Wetting in Reactor Technology. J. W. Taylor. *Journal of Nuclear Energy*, v. 2, Aug. 1955, p. 15-30.

Fundamental forces responsible for the spreading of a liquid metal on a solid (or a liquid) surface are discussed, and a no. of interfacial tension and spreading studies are analyzed, in terms of the theoretical considerations. Diagrams, tables, graph. 32 ref.

13336* Some Experimental Results Obtained With the Aid of Photographic Plates Bombarded by High-Energy Nucleons. **Quelques résultats expérimentaux obtenus a l'aide de plaques photographiques bombardées par des nucléons de haute énergie.** (French.) Jean Combe. *Journal de physique et le radium*, v. 16, no. 6, June 1955, p. 445-457.

Results of study of stars produced in photographic emulsions by high-energy (340 m.e.v.) nucleons. Photographs, graphs, diagrams. 23 ref.

13337 Superconductivity of Tin Isotopes. J. M. Lock, A. B. Pippard, and D. Shoenberg. Paper from LOW-TEMPERATURE PHYSICS. National Bureau of Standards Circular 519. p. 31-32. 1952. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (QC278 Un3.5L)

Detailed measurements of the transition temperatures and critical magnetic fields of isotopes of Sn that have been electromagnetically separated. 6 ref.

13338 The Nuclear Properties of Beryllium. John R. Stehn. Paper from THE METAL BERYLLIUM. p. 328-366. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Nuclear Physics, Nucleonics, and Radiation

Behavior of Be towards "cold", "warm", epithermal, and fast neutrons; electromagnetic radiations; and reactions produced by deuterons, α particles, and protons. Graphs, tables. 153 ref.

13339 Effect of Neutron Radiation on Aluminum Alloys. R. V. Steele and W. P. Wallace. *Metal Progress*, v. 68, July 1955, p. 114-115.

Increasing tensile and yield strength and decreasing the ductility of annealed samples by means of neutron irradiation. Graphs, tables.

13340 Apparatus for Studying Irradiated Liquid Metals. R. J. Teitel. *Nucleonics*, v. 13, July 1955, p. 50-51.

The effect of irradiation on micro-structure of liquid-metal fuels for power reactors. Photographs, micrographs. 1 ref.

13341* On Neutrons. **Über Neutronen.** (German.) Viktor Loeck. *Röntgen Blätter*, v. 8, no. 7, July 1955, p. 194-202.

Methods of production and detection. Nuclear transformation.

13342 Atomic Arrangements in Close-Packed Structures. Lester W. Strock. *Sylvania Technologist*, v. 8, July 1955, p. 71-76.

General features of close-packed structures are described, with ZnS as a model. The subject of polytypes is introduced, and these structures, as well as the more common forms of ZnS, are illustrated. Photographs, diagrams. 7 ref.

13343* Radioactive Isotopes. **Radioaktive isotoper.** (Norwegian.) Einar Saeland. *Tidsskrift for Kjemi, Bergvesen og Metallurgi*, v. 15, no. 6, 1955, p. 101-103.

Weight per unit radiation and specific activities of 34 artificial isotopes and isotopic compounds. Tables.

13344 Statistical Aspects of the Nucleus. *U. S. Atomic Energy Commission, BNL-331*(C-21,) Jan. 1955, 113 p. (UF767 Un3.1bn)

Six papers presented on low energy, elastic, and inelastic scattering, and nuclear reactions. Graphs.

13345 Penetration of Neutrons From Point Isotropic Monoenergetic Sources in Water. R. Aronson, J. Certaine, and H. Goldstein. *U. S. Atomic Energy Commission, NYO-6269*, Dec. 1954, 52 p. (UF767 U3ny)

Doses and differential no. spectra at distances of up to 120 cm. are presented for neutrons in water from several point isotropic sources. Graphs, tables. 10 ref.

13346 A Transient Heat Transfer Analysis of the MTR Mock-Up. H. F. Poppendiek and H. C. Claiborne. *U. S. Atomic Energy Commission, ORNL-976*, Apr. 1951, 28 p. (UF767 U3o)

Includes tables, diagrams, graphs.

13347 Table of Isotopes. J. M. Hollander, I. Perlman, and G. T. Seaborg. *U. S. Atomic Energy Commission, UCRL-1928*, Dec. 1952, 180 p. (UF767 U3u)

Complete list of all radioactive and stable isotopes of the elements, together with a no. of their salient features, as recorded in the literature or by private communication by approximately Dec. 1952. Graphs, tables, diagrams. 2,940 ref.

13348 An Electron Model Phase-Compensated C-W Cyclotron. Robert Pyle. *U. S. Atomic Energy Commission, UCRL-2344*, Mar. 1955, 85 p. (UF767 U3u)

Design; construction features; performance data. Tables, graphs, diagrams, photographs.

13349 Liquid Hydrogen Bubble Chambers. Harry Cline Dittler and Thomas Frank Gerecke. *U. S. Atomic Energy Commission, UCRL-2985*, May 1955, 67 p. (UF767 U3u)

Design and operation of detector which permits taking photographs with little or no background contamination at a frequency matching the pulse rate of Bevatron-Cosmotron type accelerators. Photographs, diagrams. 12 ref.

13350 High-Energy Induced Fission Theory and Application. Robert R. Hart. *U. S. Atomic Energy Commission, UCRL-2996*, May 1955, 36 p. (UF767 U3u)

Description of the mode of fission of Bi by deuterons and a comparison of this type of fission with slow-neutron fission of U-235.

Diagrams, graphs, tables, photographs. 14 ref.

13351* Contemporary State of Theories on β-Decay. **Sovremennoe sostoianie teorii β-raspada.** (Russian.) Ia. B. Zel'dovich. *Uspekhi Fizicheskikh Nauk*, v. 56, no. 2, June 1955, p. 165-200.

Properties of different invariants and analogy with electromagnetic interaction, light particles formed during β-decay, numerical values of constants of interaction, meson corrections, and transitional particles. Diagrams, table. 89 ref.

13352* Beta-Decay of Light Nuclei. **Beta-raspad legkikh iader.** (Russian.) Ia. Smorodinskii. *Uspekhi Fizicheskikh Nauk*, v. 56, no. 2, June 1955, p. 201-214.

Formulas for matrix elements; light and other nuclei. Diagram, table. 33 ref.

Books and Miscellaneous Publications

13353 Mesons and Fields. Hans A. Bethe and Frederic de Hoffmann. v. II. Mesons. 446 p. 1955. Row, Peterson and Co., White Plaines, N. Y. (QC173 B46m)

Experiments in the field of meson physics are discussed with particular stress on their interrelation and comparison with theory. Results obtained by the use of high energy machines in such fields as meson-nucleon scattering and photoproduction are given.

13354 The Atom Story. J. G. Feinberg. 243 p. 1953. Philosphical Library, New York. (QC173 F32a)

Non-technical history of development and uses of at. energy. Discusses reactor physics and nuclear theory. Summarizes present direction of research trends and gives some possible future possibilities.

13355 Materials for Nuclear Power Reactors. Henry H. Hausner and Stanley B. Roboff. Reinhold Pilot Book No. 7. 224 p. 1955. Reinhold Publishing Corp., New York. (QC776 H29m)

Properties, problems, and applications of metals and other materials for structural components, fuels, coolants, and moderators.

13356* **Handbook of Radiology.** Russell H. Morgan and Kenneth E. Corrigan, editors. 518 p. 1955. Year Book Publishers, Chicago. (QC475 M82h)

A compilation of quantitative data useful to workers engaged in the clinical, experimental, and industrial applications of ionizing radiations. Mainly, these data are presented in tabular form, but, where graphical presentation is more desirable, this method was adopted.

See also:

12433 (radiation effects on plant seeds)
12442 (radioisotopes in biology and agriculture)
12740 (atomic energy survey)
13118 (radioactive tracer techniques)
13119 (radioactive tracer technique)
13434 (nuclear and meson physics)
13443 (gamma-ray effects on polyethylene)
13449 (effect of radiation on plastics)
13464 (radioactive air pollution)

OPERATIONS RESEARCH AND MANAGEMENT ENGINEERING

13357 Personnel Practices of Foundries in the Southeast. H. Ellsworth Steele, William R. Myles, and Sherwood C. McIntyre. *Alabama Polytechnic Institute, Engineering Experiment Station, Engineering Bulletin No. 21*, Feb. 1955, 16 p. (T1 AL11b)

Comparisons of employment practices, wage policies, and personnel management procedures in southeastern U. S. Photographs, graphs, tables.

13358 The Application of Statistics to Simple Fixed-Gage Design. H. C. Charbonneau. *ASME, Transactions*, v. 77, Aug. 1955, p. 949-955; disc., p. 955-956.

The application of statistics to quality control; design and selection of gages; application of unilateral and bilateral theories of tolerances. Tables, graphs, diagrams.

13359 How to Design Effective Experiments. Frank Proschan and Alfred B. Babcock, Jr. *Chemical Engineering*, v. 62, Aug. 1955, p. 191-198.

Statistical approaches, which can cut down on the no. of runs needed, increase accuracy, and save time in planning, conducting, and interpreting complex experimental work in laboratory, plant, or office. Tables. 5 ref.

13360 Problems of the Control of Dimension, Shape, and Finish in the Rolloing of Sheet and Strip and in the Drawing of Wire. Hugh Ford and J. G. Wistreich. Paper from THE CONTROL OF QUALITY IN THE PRODUCTION OF WROUGHT NON-FERROUS METALS AND ALLOYS. Pt. II. THE CONTROL OF QUALITY IN WORKING OPERATIONS. Institute of Metals Monograph and Report Series No. 16. p. 5-14 + 1 plate. Institute of Metals, London. (TN758 In7c)

Definition of the property and methods for its measurement; causes of variation of the property and methods of control; technical and economic appraisal of possible methods of control, with reference to tolerated variations. Tables, diagrams, micrographs. 21 ref.

13361 The Control of Quality in the Hot and Cold Rolling of Aluminium and Aluminium Alloys. F. King and A. N. Turner. Paper from THE CONTROL OF QUALITY IN THE PRODUCTION OF WROUGHT NON-FERROUS METALS AND ALLOYS. Pt. II. THE CONTROL OF QUALITY IN WORKING OPERATIONS. Institute of Metals Monograph and Report Series No. 16. p. 15-30 + 1 plate. 1954. Institute of Metals, London. (TN758 In7c)

Theoretical and practical implications of the control of the tensile strength, bending and pressing properties, corrosion-resistance, and surface finish of Al alloy sheet and strip. Effect of fabricating process on properties. Graphs, photograph, table, micrographs. 10 ref.

13362 The Control of Properties and Structure in the Hot and Cold Rolling of Copper and Copper-Base Alloys. W. W. Kee. Paper from THE CONTROL OF QUALITY IN THE PRODUCTION OF WROUGHT NON-FERROUS METALS AND ALLOYS. Pt. II. THE CONTROL OF QUALITY IN WORKING OPERATIONS. Institute of Metals Monograph and Report Series No. 16. p. 31-46 + 1 plate. 1954. Institute of Metals, London. (TN758 In7c)

Methods of controlling grain-size, directionality, shape, gage, and surface quality; influence of impurities on processing and structure. Graphs, photograph, tables, micrographs. 24 ref.

13363 Some Factors Affecting the Quality of Extrusions. Christopher Smith and Norman Swindells. Paper from THE CONTROL OF QUALITY IN THE PRODUCTION OF WROUGHT NON-FERROUS METALS AND ALLOYS. Pt. II. THE CONTROL OF QUALITY IN WORKING OPERATIONS. Institute of Metals Monograph and Report Series No. 16. p. 47-57. 1954. Institute of Metals, London. (TN758 In7c)

The practice of extrusion is discussed in the light of its effects on the quality of Cu and Al alloy products made by this process. Tables. 7 ref.

13364 Statistical Control in Metal-Working Operations. M. Whyte. Paper from THE CONTROL OF QUALITY IN THE PRODUCTION OF WROUGHT NON-FERROUS METALS AND ALLOYS. Pt. II. THE CONTROL OF QUALITY IN WORKING OPERATIONS. Institute of Metals Monograph and Report Series No. 16. p. 58-68. 1954. Institute of Metals, London. (TN758 In7c)

Selection, control, and sensitivity of routine test. Applications to specific problems. Graphs. 17 ref.

13365 Organization and Use of Statistical Quality Control. M. Vercoutere. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. I. p. 111-137; disc., p. 138-140, 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Inspection procedures of a French plant, manufacturing agricultural machinery and tractors. Graphs, tables, diagrams. 1 ref.

13366 Statistical Techniques as Aids to Production Efficiency (The Role of Routine Inspection). B. P. Dudding. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. I. p. 141-160; disc., p. 161-163. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Analysis of various inspection schemes in use in British plants. Graphs, photographs. 6 ref.

13367 The Application of Pneumatic Gauging to Inspection Problems. F. R. Boosey. Paper from ENGINEERING DIMENSIONAL METROLOGY. v. I. p. 247-256; disc., p. 280-287. 1955. Her Majesty's Stationery Office, London. (T50 G79e)

Gaging principles and equipment; electric circuits; comparative efficiencies of pneumatic and other gages. Diagrams.

13368 Steel Founders Prove That Safety Is No Accident. Jack C. Miske. *Foundry*, v. 83, Aug. 1955, p. 110-113.

Program of the Steel Founders' Society of America to promote safety programs in the plants of the member foundries. Photographs, graph.

13369 The First Half-Century in the History of the Institute of British Foundrymen (1904-1954). T. Makemson. *Institute of British Foundrymen, Proceedings*, v. 47, 1954, p. 257A-275A. (TS200 In7p)

Developments in organization, activities, and growth.

13370 Pre-Attack Planning for Industrial Defense. W. R. Ramsay. *Iron and Steel Engineer*, v. 32, July 1955, p. 75-78; disc., p. 79-80.

A brief outline of the community problem of pre-attack planning and the relation of industrial phases as a counterpart. Diagrams, tables.

13371 Health Hazards From Beryllium. Merril Eisenbud. Paper from THE METAL BERYLLIUM. p. 620-640. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Discussion of the health problems, symptoms of the infection, and methods of handling the material to prevent the health hazard. Photographs, table. 16 ref.

13372 The Supply of Metallurgists With Graduate Training. Michael B. Bever. *Metal Progress*, v. 68, Aug. 1, 1955, p. 82-85, 168.

The no. of Masters' degrees in metallurgy granted in the U. S. hit a peak in 1950 and 1951, dipped sharply in 1952 and 1953, but is on the way back up. In the same period the no. of Doctors' degrees has shown a steady upward trend. Graph, tables.

13373 Production Control of Quality Steels. I-II. R. W. Graham. *Steel*, v. 137, Aug. 8, 1955, p. 78-79; Aug. 15, 1955, p. 142-145.

Depicts industrial demand for precise quality control and the importance of operating personnel in the program. Photographs, graphs.

13374 Quality Control: A Welding 'Must'. E. C. Osborne. *Welding Engineer*, v. 40, Aug. 1955, p. 38-39, 46.

The hows and wherefores of establishing effective quality control measures in the shop. Photograph, charts.

Books and Miscellaneous Publications

13375* Production Handbook. L. P. Alford and John R. Bangs, editors. 1676 p. 1954. The Ronald Press Co., New York. (TS155 AL28p)

Problems involved in directing men, materials, and machines of a manufacturing establishment; planning and control of effective production, time schedules, and budget and cost requirements.

13376 Handbook of Industrial Engineering and Management. William Grant Ireson and Eugene L. Grant, editors. 1203 p. 1955. Prentice-Hall, Englewood Cliffs, N. J. (T56 H19)

Business organization and management; job rating; hygiene; safety; operations research; personnel relations; cost and disbursement accounting.

Operations Research and Management Engineering

13377 Organization for Production. Edwin Scott Roscoe. 472 p. 1955. Richard D. Irwin, Homewood, Ill. (T56 R71o)

Principles of business management including product engineering, manufacturing, sales administration, and personnel management.

13378 Industrial Management. William R. Spriegel and Richard H. Lansburgh. 5th Ed. 601 p. 1955. John Wiley & Sons, New York. (T56 Sp81i5)

The relationships and interdependence of the various major departments of a business; policies and principles of successful management and the devices to carry them out.

13379 The Control of Quality in the Production of Wrought Non-Ferrous Metals and Alloys. Pt. II. The Control of Quality in Working Operations. Institute of Metals Monograph and Report Series No. 16. 87 p. 1954. Institute of Metals, London. (TN758 In7c)

Proceedings of a symposium held in London on Apr. 28, 1954. Individual papers separately abstracted.

13380 Organizational and Personnel Problems of the Manufacturing Executive. M. J. Dooher, editor. Manufacturing Series, Number 204. 43 p. 1953. American Management Assn., New York. (HD31 Am350)

Six papers presented at the Manufacturing Conference of the American Management Assn. covering management, organization, research, incentives, and the technical manpower problem.

ORE AND MATERIALS BENEFICIATION

13381 Mineral Flotation With Ultrasonically Emulsified Collecting Reagents. S. C. Sun, L. Y. Tu, and E. Ackerman. *Mining Engineering*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 202, July 1955, p. 656-660.

With the aid of emulsifiers, intense H.F. sound waves are capable of emulsifying any collector in water. The data show the ultrasonically emulsified collectors are more effective in floating mineral than the non-emulsified collectors. Tables, graphs, diagrams, photograph. 16 ref.

13382 Pelletizing of Iron Ore Concentrates. II. T. L. Joseph. *Blast Furnace and Steel Plant*, v. 43, July 1955, p. 745-752.

The role of oxidation and recrystallization in the bonding of pellets which will resist breakage during handling and shipping. Graphs, micrographs, table, diagram, photographs. 5 ref.

13383* Milling at Lynn Lake. R. T. Drake. *Canadian Mining and Metallurgical Bulletin*, v. 48, no. 519, July 1955, p. 390-395 *Canadian Institute of Mining and Metallurgy, Transactions*, v. 58, 1955, p. 206-211.

Crushing and milling operations on Cu-Ni ores. Flowsheet, tables.

13384* Processing of Monazite. C. S. Acharya. *Central Electrochemical Research Institute, Karaikudi, Bulletin*, v. 2, Jan. 1955, p. 20-23.

Combined gravity, magnetic, and chemical treatment of Travancore beach sands for recovery of Th, U, and rare earths. 17 ref.

13385* Comparative Study of the Reactivity of Cokes and Their Internal Surface. **Étude comparative de la réactivité des cokes et de leur surface interne.** (French.) Marthe Bastick, Jack Bastick, Michel Moutach, and Henri Guérin. *Comptes rendus*, v. 240, no. 26, June 27, 1955, p. 2524-2526.

Describes hydroreactivity and carboxyreactivity tests made on different cokes. Study of variation of surface as a function of degree of wear by CO_2 and H_2O. Graphs. 4 ref.

13386 Marmora Mine and Plant Ships Pellets to Feed Bethlehem's Blast Furnaces. *Engineering and Mining Journal*, v. 156, July 1955, p. 75-79.

Mine and plant facilities for handling 37% Fe ore which is enriched to 65% Fe pellets and shipped from Picton, Ontario dock. Flowsheet, photographs.

13387 How Bunker Hill Blends Charge for Better Lead Smelting. *Engineering and Mining Journal*, v. 156, July 1955, p. 83-85.

New $2.5 million Kellogg, Idaho, plant consists of four separate units; crushing, proportioning, bedding, and pelletizing. Flowsheet, photographs.

13388 Flotation Tests on an Oxidized Lead-Zinc Ore From the Coeur D'Alene District, Idaho. Lewis S. Prater. *Idaho Bureau of Mines and Geology, Pamphlet No.* 104, July 1955, 12 p. + 3 plates. (QE103 Id1.5p)

Testing procedures and results. Extremely fine grinding would be necessary to liberate the minerals. Tables, micrographs.

13389* Spectral Analysis of Slags. **Spektral'nyi analiz shlakov.** (Russian.) N. V. Buianov. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia*, v. 19, no. 1, Jan.-Feb. 1955, p. 89-93.

Equipment and methods; comparison with other analytical methods. Tables. 30 ref.

13390* Spectrochemical Methods for the Analysis of Open-Hearth Slags for All Basic Components. **Spektrokhimicheskie metody analiza martenovskikh shlakov na vse osnovnye komponenty.** (Russian.) O. I. Nikitina. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia*, v. 19, no. 1, Jan.-Feb. 1955, p. 94-96.

Analysis of solid and dissolved slags. Tables.

13391* Beneficiation of Low Grade Pyrite From Amjor, Bihar. S. K. Banerjee and P. I. A. Narayanan. *Journal of Scientific & Industrial Research*, v. 14, sec. B, Mar. 1955, p. 115-117.

Results of an investigation to determine the amenability of the ore to the ordinary ore-dressing methods, and to find the grade and recovery that could be obtained. Tables.

13392* Kinetics of Sulfide Film Formation on Heavy Metal Oxide Surfaces Under Flotation Conditions. **Kinetika obrazovaniia sul'fidnykh plenok na poverkhnosti okislennykh mineralov tiazhelykh metallov v usloviiakh flotatsii.** (Russian.) S. I. Mitrofanov, I. A. Strigin, V. G. Kushnikova, and G. S. Rozhavskii. *Kolloidnyi Zhurnal*, v. 17, no. 3, May-June 1955, p. 235-241.

Relation of rate of sulfidization to concentration of Na_2S and to temperature, in the case of cerussite and malachite. Graphs. 2 ref.

13393 Occurrence of Beryllium Ores and Their Treatment. W. R. Griffitts and J. J. Norton. Paper from THE METAL BERYLLIUM. p. 42-48. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Distribution; occurrence in pegmatites and non-pegmatic rocks; methods of prospecting, exploration, evaluation; beryl mining and world resources. 7 ref.

13394 The Canadian Aluminum Industry Today. I. H. Jenks. *Metal Progress*, v. 68, July 1955, p. 90-93.

Expansion of Al producing facilities in northwest Canada and use of Al in Canadian industry. Photographs, tables.

13395* Studies on the Beneficiation of Domestic Manganese Ores. (Japanese.) Yuji Yamamoto, Tooru Ishihara, Tadaya Hoshino, Kenji Tomita, Hisanao Koizumi, Yasumichi Kagami, and Kotaro Suzuki. *Resources Research Institute, Report, (Japan)*, 1955, no. 24, June, 41 p.

A study to determine how much domestic Mn ore, especially Mn carbonates and oxides, can be beneficiated by such processes as jigging, tabling, and flotation. Tables, micrographs, graphs, photographs, diagrams. 92 ref.

PHYSICS

13396 Relaxations in the Attenuation of Single Crystal Lead at Low Temperatures and Their Relation to Dislocation Theory. W. P. Mason. *Acoustical Society of America, Journal*, v. 27, July 1955, p. 643-653.

Measured results correlate well with a relaxation due to the displacement of a dislocation from one at. line to an adjacent one against the limiting shearing stress of the crystal. Graphs, diagrams. 15 ref.

13397* **Accurate Determination of Thermal Conductivities.** (English.) D. G. Gillam, Lars Rombén, Hans-Erik Nissen, and Ole Lamm. *Acta Chemica Scandinavica*, v. 9, no. 4, 1955, p. 641-656.

The accuracy of a hot wire precision method permits an accuracy for both solids and liquids, up to about ± 0.3%. Diagrams, graphs. 3 ref.

13398* The Equation of State of van der Waals (Status of Present-Day Knowledge). **Die Zustandsgleichung von van der Waals.** (German.) H. Benzler. *Allgemeine Wärmetechnik; Zeitschrift für Wärme- und Kältetechnik*, v. 6, no. 2, 1955, p. 28-31.

Includes graphs. 34 ref.

13399* Sound Waves Emitted by an Air Jet. **Ondes sonores émises par un jet d'air.** (French.) Marie Merle. *Comptes rendus*, v. 240, no. 21, May 23, 1955, p. 2055-2057.

Optical method for visualizing sound waves emitted by a supersonic air jet. Photograph, graph. 1 ref.

13400* Experimental Results and Attempts to Interpret the Scintillation Effect of Granular Metallic Layers. **Résultats expérimentaux et tentatives d'interprétation relatives à l'effet de scintillation des couches métalliques granulaires.** (French.) Nicolas Nifontoff. *Comptes rendus*, v. 240, no. 22, June 1, 1955, p. 2128-2130.

Compares variations of resistance and scintillation effects of thin layers of Ag as a function of the intensity of the d.c. that passes through them and an interpretation of these phenomena. Graphs. 5 ref.

13401* Application of the Theory of Explosive Waves to the Growth of Martensite. **Application de la théorie des ondes explosives à la croissance de las martensite.** (French.) Charles Crussard. *Comptes rendus*, v. 240, no. 24, June 13, 1955, p. 2313-2315.

Presents calculations showing that a shock and reaction wave may propagate in a solid at a rate of the order of that of sound, and indicates probability that martensite is formed by this mechanism. Diagram. 5 ref.

13402 Antimony Oxide Phosphor With Red Emission. Yoshihide Kotera and Tadao Sekine. *Electrochemical Society, Journal*, v. 102, July 1955, p. 390-393.

Account of a phosphor which is capable of emitting red fluorescent light fairly efficiently when excited with ultra-violet radiation. Tables, graphs. 2 ref.

13403* Bases for the Development of Soft Magnetic Materials. **Grundlagen der Entwicklung weichmagnetischer Werkstoffe.** (German.) Hermann Fahlenbrach. *Elektrotechnische Zeitschrift*, v. 76, Ausgabe A, no. 13, July 1955, p. 449-455.

Characteristics of the materials; internal process of magnetization; influence of purity; ferromagnetic semiconductors. Micrographs, graphs, diagram. 29 ref.

13404 The Elasticity of the Crystalline Medium. **Sur l'élasticité du milieu cristallin.** (French.) Jean Laval. Paper from L'ÉTAT SOLIDE. p. 273-312; disc., p. 313. 1952. Institut International de Physique Solvay, Brussels. (QC125 In7.4e)

Mathematical analysis of the at. theory of crystalline elasticity, excluding the hypothesis of central forces. 21 ref.

13405 Crystal Growth and Dislocations. (English.) F. C. Frank. Paper from L'ÉTAT SOLIDE. p. 315-335; disc., p. 336-343. 1952. Institut International de Physique Solvay, Brussels. (QC125 In7.4e)

Theories; surface nucleation; growth spiral interactions. Diagrams, graphs, micrographs. 26 ref.

13406 Study of Interferences of Thermal Agitation Waves in Crystals: Application to the Activation of Transformations. **Etude des interférences des ondes d'agitation thermique dans les cristaux: application à l'activation des transformations.** (French.) C. Crussard. Paper from L'ÉTAT SOLIDE. p. 345-369; disc., p. 370-375. 1952. Institut International de Physique Solvay, Brussels. (QC125 In7.4e)

Calculation of the probability of cooperative movements; applications. Graphs. 20 ref.

13407 On the Generation of Vacancies by Moving Dislocations. (English.) Frederick Seitz. Paper from L'ÉTAT SOLIDE. p. 377-407; disc., p. 408-413. 1952. Institut International de Physique Solvay, Brussels. (QC125 In7.4e)

Mode of generation and densities of generated vacancies; mobility of vacancies and pairs. Influence of cold work on rate of precipitation. Diagrams, graphs. 34 ref.

13408 The Domain Model of Hysteresis. I. Independent Domains. J. A. Enderby. *Faraday Society, Transactions*, v. 51, June 1955, p. 835-848.

Studies of domains in thermodynamic equilibrium. Graphs, diagrams. 4 ref.

13409 Sound Measurements at Very High Levels. Arnold Peterson. *Institute of Radio Engineers, Transactions on Audio*, v. AU-3, no. 3, May-June 1955, p. 71-76. (TK1 In6.6au)

Behavior of a no. of microphones at high sound levels. Problems encountered in making measurements at high sound levels. Photographs, diagram, graphs.

13410* Absorption Spectrum and Thermoluminescence Curve of Melted Quartz Irradiated by X- or γ-Rays. **Spectre d'absorption et courbe de thermoluminescence du quartz fondu irradié par les rayons X ou γ.** (French.) M. Lautout. *Journal de chimie physique*, v. 52, no. 3, Mar. 1955, p. 259-266.

Relationship between the five absorption spectrum bands of melted quartz irradiated by X- or γ-rays and the max. emission of the thermoluminescence curve. Tables, ultra-violet spectra. 8 ref.

13411* Observations of Phenomena Developing in Liquids Subjected to Ultrasonics in the Presence of Various Gases at Variable Pressures. **Observations de phénomènes se développant dans les liquides soumis a des ultra-sons en présence de divers gaz a des pressions variables.** (French.) René-Guy Busnel and Maurice Degrois. *Journal de chimie physique*, v. 52, no. 3, Mar. 1955, p. 279-293 + 2 plates.

Includes diagrams, graphs, photographs, tables. 14 ref.

13412* Viscosity and the Role of Thermodynamics in Rheological Liquids. **Die Viskosität und die Rolle der Thermodynamik bei rheologischen Flussigkeiten.** (German.) F. Schultz-Grunow. *Kolloid-Zeitschrift*, v. 141, no. 3, May 1955, p. 173-177.

Mathematical discussion on the extension and critical evaluation of the concept of viscosity. 13 ref.

13413 Superconductivity and Lattice Vibrations. J. Bardeen. Paper from LOW-TEMPERATURE PHYSICS. National Bureau of Standards Circular 519. p. 5-10. 1952. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (QC278 Un3.3L)

Discussion of the nature of wave functions and energies for electrons in superconductors and the theory that leads to equations that explains the electromagnetic properties of the superconducting phase. Diagrams. 7 ref.

13414 On the Nature of the Superconducting Transition. L. Tisza. Paper from LOW-TEMPERATURE PHYSICS. National Bureau of Standards Circular 519. p. 11-20. 1952. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (QC278 Un3.5L)

A half phenomenological theory is presented that provides a comprehensive qualitative framework for the quantum mechanics of solids. The adiabatic approximation non-metallic crystals at finite temperatures, and normal and superconducting metals are discussed. 12 ref.

13415 Heat Transfer in Superconducting Alloys. J. K. Hulm. Paper from LOW-TEMPERATURE PHYSICS. National Bureau of Standards Circular 519. p. 37-41. 1952. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (QC278 Un3.5L)

Experimental data for a very uniform composition, single-crystal specimen containing 10 at.% of Tl, the highest composition to which the heat conduction measurements have so far been extended. Graphs. 8 ref.

Physics

13416 Specific Heat of Niobium at Various Temperatures. A. Brown, M. W. Zemansky, and H. A. Boorse. Paper from LOW-TEMPERATURE PHYSICS. National Bureau of Standards Circular 519. p. 99-101. 1952. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (QC278 Un3.5L)

Method of circumventing discrepancies in the calculation of the specific heat by the use of calorimetry. Graphs. 3 ref.

13417 Atomic Heats of Copper, Silver, and Gold From 1°K to 5°K. William S. Corak, M. P. Garfunkel, C. B. Satterthwaite, and Aaron Wexler. *Physical Review*, v. 98, ser. 2, June 15, 1955, p. 1699-1707.

Determinations in the temperature interval 1.0 to 5.0 K. The measured values can be described adequately by a linear plus a cubic term in temperature. Diagram, graphs, tables. 25 ref.

13418 Solution of the Hartree-Fock-Slater Equations for Silicon Crystal by the Method of Orthogonalized Plane Waves. Truman O. Woodruff. *Physical Review*, v. 98, ser. 2, June 15, 1955, p. 1741-1742.

The orthogonalized plane wave method is used to compute estimates of the energy eigenvalues associated with states for which k=0 in the valence and conduction bands of a perfect Si crystal. Table. 5 ref.

13419 Magnetization Reversal in Thin Films. R. L. Conger. *Physical Review*, v. 98, ser. 2, June 15, 1955, p. 1752-1754.

An experiment was performed which indicates that magnetization reversal, in evaporated films of 80% Ni 20% Fe, 2 X 10^{-5} centimeter thick, takes place by domain rotation rather than by the motion of 180° domain walls. Photograph, diagrams. 2 ref.

13420 Lattice Resistance to Dislocation Motion at High Velocity. Edward W. Hart. *Physical Review*, v. 98, ser. 2, June 15, 1955, p. 1775-1776.

Dissipative effects at high velocities, resulting from coherent collisons of dislocations with the lattice sites, were estimated and found to be too small to limit the dislocation velocity. 7 ref.

13421 Nuclear Magnetic Resonance Saturation and Rotary Saturation in Solids. Alfred G. Redfield. *Physical Review*, v. 98, ser. 2, June 15, 1955, p. 1787-1809.

Nuclear spin-lattice relaxation times of Al^{27} in pure Al and Cu^{63} in annealed pure Cu were measured with a nuclear induction spectrometer, by the method of saturation. "Rotary saturation" is observed by applying an audio-frequency magnetic field to the sample in the d.c. field direction while observing the dispersion derivative at resonance with a large R.F. field. Graphs, diagrams, table. 44 ref.

13422 Magnetic Susceptibility of α Manganese at Low Temperatures. A. Arrott, B. R. Coles, and J. E. Goldman. *Physical Review*, v. 98, ser. 2, June 15, 1955, p. 1864-1865.

Measurements were made by an induction technique in which a disk-shaped sample is translated between two detecting coils connected in series opposition. Table. 9 ref.

13423* Variation in the Lattice Constant of Evaporated Potassium Chloride. (English.) Yasushige Fukano. *Physical Society of Japan, Journal*, v. 10, no. 6, June 1955, p. 420-424.

Measurements were made with an accuracy of 0.01% using Au foil as a standard. Tables, graph. 14 ref.

13424* Ultrasonic Investigation on Solid State at High Temperatures. **Ricerche sullo stato solido ad alta temperatura effettuate mediante ultrasuoni.** (Italian.) Piero Giorgio Bordoni. *Ricerca scientifica*, v. 25, no. 4, Apr. 1955, p. 847-859.

Elastic and anelastic behavior of metals near their melting point. The dissipation of elastic energy, when it is not affected by any relaxation phenomena, increases with temperature, and a close connection was found between this increase and creep. Graphs. 18 ref.

13425* The ΔE-Effect and Young's Modulus in Nickel-Cobalt Alloys. (English.) Mikio Yamamoto and Satoshi Taniguchi. *Science Reports of the Research Institutes, Tôhoku University*, ser. A, v. 7, no. 1, Feb. 1955, p. 35-49.

Measurements in annealed Ni-Co alloys, covering the whole composition range, were made at ordinary temperatures by the method of magnetostrictive vibration. Table, graphs. 22 ref.

13426* On the Phenomenological Theory of the Fine Exfoliating Disintegration. (English.) Muneyuki Date. *Science Reports of the Research Institutes, Tôhoku University*, ser. A, v. 7, no. 2, Apr. 1955, p. 210-228.

Phenomenological calculation of the distribution function of numerous particles which are in the process of fine exfoliating disintegration. Graphs, tables, diagrams. 10 ref.

13427* The Metric System at the 1st European Aeronautical Congress of December 14-18, 1954. **Le système métrique au 1er congrès aéronautique européen du 14 au 18 décembre 1954.** (French.) *Technique et science aéronautiques*, v. 3, 1955, p. 146-167.

Several papers on value and international unification of metric systems, its use in field of aviation, and Anglo-Saxon opposition. Photographs, diagrams.

13428 The Spectroscopy of Nuclear Gamma-Rays by Direct Crystal Diffraction Methods. Jesse W. M. DuMond. *U. S. Atomic Energy Commission, AECU-2868*, Mar. 1954, 104 p. (UF767 U3au)

A new technique for precise measuring of the wave lengths and energies of γ-rays from natural and artificial emitters from 1.3 m.e.v. to 25 k.e.v. Tables, graphs, diagrams, photographs, oscillograms. 38 ref.

13429 Free Energy Functions of the Solid and Liquid Elements. Leo Brewer. *U. S. Atomic Energy Commission, UCRL-2992*, May 1955, 7 p. (UF767 U3u)

Thermodynamic data for metals at various temperatures. Tables. 8 ref.

13430* Status of the Electric Light Research. **Stand der lichtelektrischen Forschung.** (German.) Werner Kluge. *Zeitschrift für angewandte Physik*, v. 7, no. 6, June 1955, p. 302-311.

A review. Diagram, graphs. 122 ref.

13431* Structure Investigation of Multiple-Component Systems by Kinetic Electron Diffraction. **Struktur-untersuchung von Mehrstoffsystemen durch kinematische Elektronenbeugung.** (German.) Alfred Boettcher, Günter Haase, and Rudolf Thun. *Zeitschrift für Metallkunde*, v. 46, no. 5, May 1955, p. 386-400.

Continuous recording of electron-diffraction diagrams requiring wedge-shaped specimens prepared by a special vapor-deposition process; description of preparation of specimens and the recording camera; interpretation of electron-diffraction photographs of Ag-Sn, Au-Sn, Ag-Pb-Sn, and Ag-Sb alloys. Graphs, diagrams, micrographs. 34 ref.

13432* Experimental Contribution to the Field Excitation of Electrons From Terms in the Forbidden Zone. **Ein experimenteller Beitrag zur Feldanregung von Elektronen aus Termen in der verbotenen Zone.** (German.) H. Gutjahr and E. Gutsche. *Zeitschrift für Naturforschung*, v. 10a, no. 4, Apr. 1955, p. 342-344.

Effect of X-ray treatment on the conductivity of CdS crystals as a function of field strength. Graphs. 4 ref.

13433* Participation of Oxygen in the Formation of Zinc Sulfide Phosphors. **Uchastie kisloroda v obrazovanii tsink-sul'fidnykh liuminoforov.** (Russian.) N. Ril' and G. Ortman. *Zhurnal Obshchei Khimii*, v. 25, no. 6, June 1955, p. 1057-1065.

Effect of O on the action of halogenide fusing agents, and its participation in the structure of illumination centers. Tables, diagram. 9 ref.

Books and Miscellaneous Publications

13434 The 1954 Glasgow Conference on Nuclear & Meson Physics, Proceedings. E. H. Bellamy and R. G. Moorhouse, editors. 352 p. 1955. Pergamon Press, New York. (QC173 C75.6p)

Contains over 100 papers divided into the following sections: nuclear forces and nucleon scattering; nuclear data and models; photodisintegration; β- and γ-ray transistions; π-mesons; field theory; high energy experimental technique; and heavy mesons and hyperons.

13435 Optical Properties of Thin Solid Films. O. S. Heavens. 261 p. 1955. Academic Press, New York. (QC367 H35o)

Formation; structure; optics; measurements of film thickness and optical constants.

13436 Bessel Functions for Engineers. N. W. McLachlan. Oxford Engineering Science Series. 2nd Ed. 239 p. 1955. Oxford University Press, London. (QA408 M22b)

Functions of various orders; expansions; applications.

13437 Applied Thermodynamics. (Formerly "Heat Power".) Earle B. Norris, Eric Therkelsen, and Clarence E. Trent. 3rd Ed. 490 p. 1955. McGraw-Hill, New York. (TJ265 N79a)

Engines; heat, power, and work; steam apparatus; compressors; refrigeration.

13438 The Solid State. **L'état solide.** R. Stoops, editor. 576 p. 1952. Institut International de Physique Solvay, 76-78, Coudenberg, Brussels, Belgium. (QC125 In7.4e)

Sixteen English, German, and French reports on solid state physics presented at the Ninth Council of Physics at Brussels, Belgium in Sept. 1951. Papers are individually abstracted.

13439 Low-Temperature Physics. National Bureau of Standards Circular 519. 291 p. 1952. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. (QC278 Un3.5L)

Proceedings of the NBS Semicentennnial Symposium on Low Temperature Physics and covering several fields, including the properties of liquid helium, super-conductivity, calorimetry, thermometry, and liquefier development. Pertinent papers are individually abstracted.

See also:

12712 (adsorption of gases on germanium)
12759 (X-ray absorption by quartz crystals)
12812 (measurement of magnetic fields)

PLASTICS

13440 Polyethylene. E. L. Kropa and P. B. Stickney. Paper from THE CHEMISTRY OF PETROLEUM HYDROCARBONS. v. III. p. 195-206. 1955. Reinhold Publishing Corp., New York. (QD305.H5 C42)

History, commercial production, physical properties, structure, and polymerization kinetics of this World War II plastic and similar compounds. 30 ref.

13441* Crystallization of Polyterephthalate of Ethylene Glycol. **Cristallisation du polytéréphtalate d'éthylène glycol.** (French.) Charles Legrand and Jean Coste. *Comptes rendus*, v. 240, no. 22, June 1, 1955, p. 2160-2162.

Macromolecular arrangement of the compound studied by X-ray diffraction on specimens having undergone heat treatments from 80 to 260 C. Graph. 3 ref.

13442 Application of the Superposition Principle and Theories of Mechanical Equation of State, Strain, and Time Hardening to Creep of Plastics Under Changing Loads. William N. Findley and Gautam Khosla. *Journal of Applied Physics*, v. 26, July 1955, p. 821-832.

Includes diagrams, tables, graphs.

13443 Action of γ-Rays on Polymers in the Solid State. **Action des rayons γ sur les polymères a l'état solide. I.** Reticulation of Polyethylene. **Réticulation du Polyéthylène.** (French.) Adolphe Chaprio. *Journal de chimie physique*, v. 52, no.3, Mar. 1955, p. 246-258.

Reticulation of polyethylene subjected to action of γ-rays was followed by measuring the melting point of the irradiated polymer. Diagram, graphs. 63 ref.

13444* Organic Dyes for Polyvinyl Chloride. **Organicheskie krasiteli dlia polivinilkhlorida.** (Russian.) A. P. Pisarenko, R. A. Liberova, and R. D. Gordonova. *Legkaia Promyshlennost'*, v. 15, no. 7, July 1955, p. 25-29.

Problems of creating attractive and fast dyes; tests and structures of azo dyes; phtholocyanine and athraquinone pigments. Tables. 2 ref.

13445 The Isocyanate-Base Polymers. Irving Katz. *Materials & Methods*, v. 42, Aug. 1955, p. 84-88.

Applications include foams, elastomers, coatings, potting compounds, adhesives, greases, and heat resistant plastics. Photographs, graphs, micrograph.

13446* Principles of Macromolecular Chemistry. **Über die Grundlagen der makromolekularen Chemie.** (German.) Hermann Staudinger. *Naturwissenschaften*, v. 42, no. 9, May 1955, p. 221-230.

Includes tables, diagram, photograph. 42 ref.

13447* A Review of Condensation Polymerization. Michael S. Rhodes. *Paint Industry Magazine*, v. 70, June 1955, p. 10-12.

Includes table. 4 ref.

13448* "Ekazell-Hart", a Plastic Material for Light Constructions. **"Ekazell-hart", ein Plastwerkstoff für Leichtkonstruktionen.** (German.) A. Eckelmann. *Plaste und Kautschuk*, v. 2, no. 4, Apr. 1955, p. 79-81.

Properties and workability of this new synthetic are excellent for construction of railroad cars, ships, airplanes, furniture, and buildings. Table, photographs, diagrams. 2 ref.

13449* Plastics in the Atomic Energy Program. Oscar Sisman. *Plastics Technology*, v. 1, July 1955, p. 345-350.

How plastics can be utilized in at. energy programs, and the effects of radiation on plastics. Graphs, photographs. 6 ref.

13450* Technique of Injection Molding. **Technika prasowania wtryskowego.** (Polish.) E. Schneider and R. Majewski. *Przemysł Chemiczny*, v. 11, no. 6, June 1955, p. 278-284.

Design, operation, and behavior of injection molding machines. Advantages and uses of the method, particularly with the thermoplastics. Photographs, diagrams, tables, graph. 6 ref.

13451 Elasticity, Relaxation, and Brownian Motion in Polymers. John D. Ferry. *Record of Chemical Progress*, v. 16, no. 2, 1955, p. 85-97.

Properties can be applied to solve practical engineering problems. Graphs, diagrams. 33 ref.

13452* Silicone—Composition, Properties, Synthesis. **Silicone—Konstitution, Eigenschaften, Synthese.** (German.) W. Noll. *Umschau in Wissenschaft und Technik*, v. 55, no. 12, June 15, 1955, p. 353-356.

Influence of chemical structure on properties. Existing methods of synthesis. Tables, diagrams, flowsheet, photographs.

13453* Mechanism of the Formation and Conversion of Silico-Organic Polymers. **O mekhanizme obrazovaniia i prevrashcheniia kremniiorganicheskikh polimerov.** (Russian.) K. A. Andrianov. *Uspekhi Khimii*, v. 24, no. 4, 1955, p. 430-439.

Formation of polyorganosiloxanes, from difunctional compounds, in aqueous solutions, and from trifunctional compounds. Graph, tables. 12 ref.

13454* Influence of the Molecular Weight of Polystyrene on the Packing Density of Its Chains. **Vliianie molekuliarnogo vesa polistirola na plotnost' upakovki ego tsepei.** (Russian.) T. V. Gatovskaia, V. A. Kargin, and A. A. Tager. *Zhurnal Fizicheskoi Khimii*, v. 29, no. 5, May 1955, p. 883-888.

Includes graphs, tables. 6 ref.

13455* Plasticization of Polyvinyl Chloride by Means of Butadiene Nitrile Copolymer. **Plastifikatsiia polivinilkhlorida butadiennitril'nym sopolimerom. III.** Effect of Varying Amounts of Butadiene Nitrile Copolymer on Temperature of Vitrification and Flow. **Vliianie na temperaturu steklovaniia i techeniia polivinilkhlorida vvedeniia v nego razlichnykh kolichestv butadiennitril'nogo sopolimera.** (Russian.) R. A. Reznikova, A. D. Zaionchkovskii, and S. S. Voiutskii. *Zhurnal Tekhnicheskoi Fiziki*, v. 25, no. 6, June 1955, p. 1045-1052.

Relation of deformation to temperature, for plasticized PVC, and to amounts of plasticizer. Graphs. 1 ref.

See also:

12639 (polyethylene insulation)

POLLUTION AND WASTES

13456 Sampling and Analyzing Air for Contaminants. Leslie Silverman. *Air Conditioning, Heating, and Ventilating*, v. 52, Aug. 1955, p. 87-100.

Procedures are described for gases, vapors, and particulate matter present as air contaminants in work places. Included are extensive tables on collection methods and analysis, and direct chemical reaction devices. Tables, diagrams. 70 ref.

13457 Cleaning of Open Hearth Stack Gases. Leslie Silverman. *Blast Furnace and Steel Plant*, v. 43, July 1955, p. 735-744, 752.

Requirements for cleaning, present methods of cleaning, agglomeration studies and their relation to filtration studies, and conclusions drawn from the study. Photographs, micrographs, diagrams, tables, graph. 5 ref.

13458 Automatic Scrap System Handles 55 Tons Per Hour. W. G. Patton. *Iron Age*, v. 176, July 28, 1955, p. 68-70.

A new fully automatic scrap baling system at the Ford Rouge plant handles up to 55 tons of sheet scrap per hr. Triple compression baler discharges a 1000 to 1100-lb. bale about every 30 sec. Photographs.

13459 Recovery of Plating Wastes. Louis Weisberg and Edmund J. Quinlan. *Plating*, v. 42, Aug. 1955, p. 1006-1011.

Processes used for the recovery of cyanide and chromate from plating wastes. Diagrams, tables, photographs. 5 ref.

13460 Practical Methods for Treatment of Metal Finishing Wastes. J. C. Hesler. *Plating*, v. 42, Aug. 1955, p. 1019-1029.

Discusses waste flows, plating bath rinse waters, heavy metal rinse waters, and practical applications. Tables, diagrams, photograph.

13461 Solids-Liquid Separation in the Treatment of Metal Finishing Wastes. R. F. Ledford. *Plating*, v. 42, Aug. 1955, p. 1030-1036.

Methods of dewatering sludge either for reuse of the water or for simple disposal of the solids by means other than lagooning. Photographs, diagrams, tables, graphs.

13462* Methods for the Determination of Dust Content in the Blast Furnace Gas. **Contribution aux méthodes de détermination des taux de poussières dans le gaz de haut fourneau.** (French.) Ch. G. Thibaut, D. Sanna, and F. Douez. *Revue de métallurgie*, v. 52, no. 6, June 1955, p. 485-507.

Measurement can be carried out with an approximation of 5% in the whole range of common concentrations from a few mg. per cu. m., in the purified gas, to 100 g. per cu. m., in the raw gas. Diagrams, tables, graphs.

13463 Some Scientific Aspects of the Urban Air Pollution Problem. Lauren B. Hitchcock and Helen G. Marcus. *Scientific Monthly*, v. 81, July 1955, p. 10-21.

Analysis and instrumentation; suggested control measures; physiological effects and plant damage. Tables, photographs, map. 8 ref.

13464* Radioactive Pollution From Nuclear Explosions. John Cockcroft. *Smokeless Air*, v. 25, Summer 1955, p. 192-196.

Present activity levels are harmless on a world-wide scale; a hundred-fold increase is still judged within safe limits.

13465* An Automatic Dust-Sampling Instrument Operating According to the Konimeter Principle. **Über ein nach dem Konimeterprinzip arbeitendes Gerät zur automatischen Staubprobenahme.** (German.) J. A. Schedling. *Staub*, 1955, no. 40, p. 237-240.

Design and operation. Diagrams, photograph, graphs.

13466* Dust Sampling With the Thermal Precipitator With Special Consideration to the Electron Microscopic Evaluation. **Staubprobenahme mit dem Thermalpräzipitator unter besonderer Berücksichtigung elektronenmikroskopischer Auswertung.** (German.) Wilhelm Walkenhorst. *Staub*, 1955, no. 40, p. 241-252.

Determination of dust concentration and grain-size distribution. Diagram, photograph, graphs, micrographs. 17 ref.

RUBBER AND ELASTOMERS

13467* Comparative Studies of Rubber Reinforcing Pigments. **Vergleichende Untersuchung von Kautschukfüllstoffen.** (German.) H. Kunowski and U. Hofmann. *Angewandte Chemie*, v. 67, no. 11, June 7, 1955, p. 289-300.

Some 60 different types are examined. Tables, graphs, micrographs. 50 ref.

13468 Liquid Neoprene Coatings. *Corrosion Technology*, v. 2, July 1955, p. 213-217.

Properties and capabilities of the coatings; case histories. Table, photographs. 3 ref.

13469* Effect of Polymerization Temperature on the Structure of Copolymers of Butadiene With Styrene. **Vliianie temperatury polimerizatsii na stroenie sovmestnykh polimerov butadiena so stirolom.** (Russian.) A. P. Sheinker and S. S. Medvedev. *Doklady Akademii Nauk SSSR*, v. 102, no. 6, June 21, 1955, p. 1143-1145.

Includes graphs, tables. 10 ref.

13470* Growth of the Fracture and Tear Test of Natural Rubber and Synthetic Elastomers. **Risswachstum und Rissprüfung bei Naturkautschuk und synthetischen Elastomeren.** (German.) Rudolf Kaiser. *Kautschuk und Gummi*, v. 8, no. 6, June 1955, p. 145WT-152WT.

Comparative investigation of the tear resistance. Graphs, photographs, diagrams, table. 12 ref.

13471* Problem of Physical Testing of Vulcanized Rubber. **Probleme der physikalischen Prüfung von Vulkanisaten.** (German.) Primus Kainradl. *Kautschuk und Gummi*, v. 8, no. 6, June 1955, p. 157WT-160WT.

Critical survey of existing methods; selection of test methods for particular types of vulcanized rubber. Graphs. 14 ref.

13472* Contribution to the Study of Fiber Structure of Rubber. **Beitrag zur Kenntnis der Fadenstruktur des Kautschuks.** (German.) M. Rachner. *Kautschuk und Gummi*, v. 8, no. 7, July 1955, p. 176WT-184WT.

Electron microscopic study of different types of rubbers, revealing a fibrous segregation of molecules which consist of fiber-like components themselves. Micrographs. 14 ref.

13473* Theory of Vulcanization and the Effect of Accelerators. **K teorii vulkanizatsii i deistviia uskoritelei.** (Russian.) B. Dogadkin, V. Seliukova, Z. Tarasova, A. Dobromyslova, M. Fel'dshtein, and M. Kaplunov. *Kolloidnyi Zhurnal*, v. 17, no. 3, May-June 1955, p. 215-229.

Interaction of rubber with dibenzothiazolyldisulfide (Altax) and vulcanization by S in the presence of Altax. Resistance to rupture during heating for rubber, rubber-sulfur, rubber-Altax, and rubber-sulfur-Altax. Graphs, tables. 17 ref.

13474* The Physics of Rubber Friction. **Zur Physik der Kautschukreibung.** (German.) Adolf Schallamach. *Kolloid-Zeitschrift*, v. 141, no. 3, May 1955, p. 165-173.

Effect of pressure, velocity, and temperature on the friction, surface condition, and electrical resistance of gliding rubber. Graphs. 13 ref.

13475* Investigation of the Process of Devulcanization in the Production of Reclaimed Rubber. **Issledovanie protsessa devulkanizatsii v proizvodstve regenerata.** (Russian.) G. V. Livyi and A. D. Zaionchkovskii. *Legkaia Promyshlennost'*, v. 15, no. 7, July 1955, p. 33-38.

Components of reclaimed rubber; effect of solid and liquid plasticizers; factors responsible for swelling of rubber compound. Tables, graphs. 7 ref.

SPACE HEATING AND CONDITIONING

13476 Chilled Water System Serves Offices of New Industrial Plant. L. F. Gaffney. *Air Conditioning, Heating, and Ventilating*, v. 52, Aug. 1955, p. 105-107.

Use of double glazing and shade screens, together with a central chilled water system gives Western Electric's new plant at Winston-Salem, N. C., an economical and flexible air conditioning system. Diagrams, photographs.

TEXTILES AND FIBERS

13477* Dyeing, Finishing, and Heat-Treating Arnel Triacetate. Fred Fortess. *American Dyestuff Reporter*, v. 44, Aug. 1, 1955, p. 524P-537P.

Present state of knowledge of the dyeing and finishing properties of "Arnel". Tables, graphs, photographs. 3 ref.

13478* The Relation of the Reflectance of Dyed Fabrics to Dye Concentration and the Instrumental Approach to Colour Matching. E. Atherton. *Society of Dyers and Colourists, Journal*, v. 71, July 1955, p. 389-398.

Includes diagrams, graphs, tables, photograph. 15 ref.

WELDING AND JOINING

13479 Strains in Flanged Pipes. J. Y. Davies and E. J. Heeley. *British Welding Journal*, v. 2, July 1955, p. 293-297.

Comparisons made between pipes of 'built-up' and 'intergral' construction, using the electrical resistance strain gage technique to determine the distribution and magnitude of strains produced under bolt loading conditions. More extensive welds add neither to strength nor safety. Graphs, diagrams, photographs.

13480 The Economic Proportion of Welding in Shipbuilding. W. R. Mellanby. *British Welding Journal*, v. 2, July 1955, p. 299-304.

Concludes that the most economic design for a cargo vessel is one with an all-welded double bottom as well as both decks, and with welded shell butts and seams; however, if large sections cannot be prepared at ground level, riveting of the shell is preferred. Tables, graphs, diagrams.

13481 A Method for Calculating the Effect of Preheat on Weldability. C. L. M. Cottrell and B. J. Bradstreet. *British Welding Journal*, v. 2, July 1955, p. 305-309.

An equation, derived by experiment, relates the cooling rate at 300 C in the weld heat-affected zone to the geometry of the joint, the size of the weld, and the initial plate temperature; applies to metal-arc welds made on mild and low-alloy steels. Tables, graphs. 6 ref.

13482 Calculated Preheat Temperatures to Prevent Hard-Zone Cracking in Low-Alloy Steels. C. L. M. Cottrell and B. J. Bradstreet. *British Welding Journal*, v. 2, July 1955, p. 310-312.

Tables present preheat temperature required for the metal-arc welding of a low-alloy steel from the dimensions and form of the joint, the weld size, and the weldability of the steel. Tables. 3 ref.

13483 Review of High Temperature Metal-Ceramic Seals. Hayne Palmour, III. *Electrochemical Society, Journal*, v. 102, July 1955, p. 160C-164C.

A technical review of the development of metal-ceramic seals with emphasis on methods devised for high temperature brazing of metals to low-loss technical ceramics for electronic applications. Photographs, diagrams, tables, graphs. 13 ref.

13484 Comparison of Welded and Riveted Ship Construction. B. Baxter. *Engineering*, v. 180, July 22, 1955, p. 108-110.

Results of investigations to find the relationship, if any, between welded ship failures and design, with particular reference to the differences in structural behavior between riveted and welded ships. Graph.

13485* Use CO_2 Shielding Gas in Automatic Welding Mild Steels. R. W. Tuthill. *Industry & Welding*, v. 28, Aug. 1955, p. 46-48, 80-82.

Control and gas requirements; speed of wire feed; appearance of weld surface; electrode specifications. Photographs, diagram.

13486* Submerged Arc Welding Fabricates a Light Weight Diesel Crankcase. Albert C. Drechsler. *Industry & Welding*, v. 28, Aug. 1955, p. 62-66.

Development of an automatic welding fixture used in the fabrication of steel forgings and flame cut steel. Photographs, diagrams.

13487* Here's How to Use Projection Welding. *Industry & Welding*, v. 28, Aug. 1955, p. 76-78, 80.

Projection sizes and shapes; current and pressures; weldable metals; precautionary measures. Table, diagrams.

13488 Pressure Welding Gives Stronger Titanium Joints. A. P. Lage and S. S. Smith. *Iron Age*, v. 176, July 14, 1955, p. 103-105.

Provides a reliable method of fabricating 3Al-5Cr Ti alloy, and produces a forged butt weld of superior strength by upsetting the faying surfaces under heat and pressure. Photographs, micrographs, table.

13489 Induction Soldering. I. D. Warburton-Brown. *Machinery Lloyd (Overseas Ed.)*, v. 27, July 23, 1955, p. 37, 39, 41-42.

Some information on the alloys used and the theoretical principles underlying the formation of joints plus a detailed description of the H.F. method of soft soldering. Diagrams, graph, tables. (To be continued.)

13490 Effect of Silicon in Submerged Arc Welds. W. Simon. *Materials & Methods*, v. 42, July 1955, p. 132-134.

Investigation to determine the effect of Si content on brittleness of weld joints. Graphs, tables. 3 ref.

13491 Joining of Beryllium. D. C. Martin. Paper form THE METAL BERYLLIUM. p. 283-294. 1955. American Society for Metals, Cleveland. (TN799.B4 W58m)

Three methods, fusion and self welding, and brazing are discussed as a means of joining Be to itself and to other metals. The use of shielded arc, straight polarity, d.c., and Be filler have yielded best results. Photographs, micrographs, diagrams, tables. 9 ref.

13492 Titanium Fasteners. Thomas F. Spoehr. *Metal Progress*, v. 68, July 1955, p. 80-81.

Problems involved in the production of Ti bolts to be used in the aircraft industry. Photograph.

13493 Stud Welding With Welding Cartridges. W. P. van den Blink, E. H. Ettema, and P. C. van der Willigen. *Philips Technical Review*, v. 17, Aug. 1955, p. 37-45.

Semiconducting welding cartridge on stud end serves as heater, spacer, and flux for correct stud placement. Diagrams, photographs. 5 ref.

13494 Adhesive Bonded Metal Joints. R. T. Schwartz and R. E. Wittman. *Product Engineering*, v. 26, July 1955, p. 170-173.

Measurements of room temperature shear strength on lap joints show that rates of loading from static to impact speeds have no effect on strength. Eight different adhesives were evaluated, ranging from rigid resin-type to less rigid rubber-resin plastic compounds. Tables, diagram, graphs.

13495* The Application of Welding in Modern Steel Building, Bridge Construction, and Rail Joining. **Die Anwendung der Schweisstechnik im neuzeitlichen Stahlhoch-, Brücken- und Gleisbau.** (German.) Otto Steinhardt. *Schweissen und Schneiden*, v. 7, no. 6, June 1955, p. 236-241.

Influence of welding on constructional development; typical elements of design for welding; examples of modern realizations of weld-fit designs; continuous rail welding. Photographs, graphs, diagrams.

13496* The Application of Welding in Shipbuilding. **Die Anwendung der Schweisstechnik im Schiffbau.** (German.) J. Hansen. *Schweissen und Schneiden*, v. 7, no. 6, June 1955, p. 241-246.

Development of welding in ships; assembly of prefabricated parts; characteristic details of welded design; influence of vibrations on welded ships; failures and their consequences. Photograph, diagrams.

13497* The Application of Welding in Modern Motor Car Fabrication. **Die Anwendung der Schweisstechnik im modernen Kraftfahrzeugbau.** (German.) Otto Gengenbach. *Schweissen und Schneiden*, v. 7, no. 6, June 1955, p. 251-256.

Welding processes, especially spot welding; constructional development of motor cars; manufacture of car bodies; electrical sets of welding machines. Photographs, diagrams.

Welding and Joining

13498* The Application of Welding in the Construction of Containers and Pipings and in Pipe Manufacture. **Die Anwendung des Schweissens im Behälter- und Rohrleitungsbau und bei der Rohrherstellung.** (German.) W. Rädeker. *Schweissen und Schneiden*, v. 7, no. 6, June 1955, p. 257-261.

Materials; bending procedure; welding methods; finishing. Photographs, graph, diagram.

13499* The Application of Welding in Modern Boiler and Pressure Vessel Design and Manufacture. **Die Anwendung des Schweissens im neuzeitlichen Kessel- und Druckbehälterbau.** (German.) R. Quack. *Schweissen und Schneiden*, v. 7, no. 6, June 1955, p. 262-264.

Welding of boiler drums, pipes, collectors, and pressure vessels. Photographs, diagrams.

13500* The Application of Welding Within Mechanical Engineering With Special Reference to Rigidity, Tension, and Straining of Material. **Die Anwendung der Schweisstechnik im Maschinenbau unter besonderer Berücksichtigung von Steifigkeit, Dehnung und Werkstoffbeanspruchung.** (German.) F. W. Griese. *Schweissen und Schneiden*, v. 7, no. 6, June 1955, p. 265-270.

Relations between working conditions, design, and material from the designer's point of view. Diagrams.

13501* Welding as a Problem of Materials. On the Brittle Fracture of Steel. **Die Schweisstechnik als Werkstoff-problem. Zur Sprödbruchneigung des Stahles.** (German.) A. Matting. *Schweissen und Schneiden*, v. 7, no. 6, June 1955, p. 270-274.

Conditions for brittle fracture; present testing methods; proposal for a new testing method. Photographs, diagrams. 13 ref.

13502* Advantages of Welding for Design and Production. **Vorteile der Schweisstechnik für Konstruktion und Fertigung.** (German.) C. Stieler. *Schweissen und Schneiden*, v. 7, no. 6, June 1955, p. 274-279.

Review of the improvements by welding, welding and casting, and welding and riveting. Photographs, graph, diagrams.

13503* Progress in the Field of Welding and Cutting. **Fortschritte auf dem Gebiete des Schweissens und Schneidens.** (German.) K. L. Zeyen. *Schweissen und Schneiden*, v. 7, no. 7, July 1955, p. 305-313.

Hydrogen in austenitic weld seams, and its influence in non-welded steel; H content in welded seams and its determination. Tables. 42 ref.

13504* Development of the Use of Gas Flux in the Joining of Metals. **Développement de l'emploi du flux gazeux dans l'assemblage des métaux.** (French.) B. Liebesman. *Soudage et Techniques connexes*, v. 9, nos. 5-6, May-June 1955, p. 119-125; disc., p. 125-126.

Describes apparatus using gas flux incorporated in the flame for welding, brazing, and solder-brazing, making it possible to eliminate cleansing powders and coated rods. Photographs, diagrams, table.

13505* A Process for Killing the Melting Bath in the Welding of Steels. **Sur un procédé de calmage du bain de fusion dans le soudage des aciers.** (French.) A. Leroy, H. Granjon, and M. Evrard. *Soudage et Techniques connexes*, v. 9, nos. 5-6, May-June 1955, p. 127-129; disc., p. 129-130.

Discusses conditions for preventing reaction between C and iron oxide during welding of steel by use of killing additions and Al metallization of the edges to be welded. Micrographs.

13506* Some Particular Applications of the Oxy-Acetylene Flame. **Quelques applications particulières de la flamme oxyacétylénique.** (French.) M. Evrard. *Soudage et Techniques connexes*, v. 9, nos. 5-6, May-June 1955, p. 141-146; disc., p. 146.

Discusses structural modifications of oxy-acetylene welds in heavy gage Al; changes in stress and surface states. Photographs, radiographs, diagram. 4 ref.

13507 Some Current Aspects of Industrial Brazing. John E. Hyler. *Steel Processing*, v. 41, July 1955, p. 426-431, 458.

Fluxes and brazing alloys, flow temperatures, electrical resistance brazing, flame-fluxing method, and aspects of furnace brazing are discussed. Photographs.

13508* Automatic Submerged-Arc Welding of Steel Sheets in Lower Position. **Avtomaticheskaia vanno-shlakovaia svarka stal'nykh listov v nizhnem polozhenii.** (Russian.) F. F. Benua and A. I. Katler. *Svarochnoe Proizvodstvo*, 1955, no. 7, July, p. 1-4.

Covering flux used; welding conditions, including current strength at each electrode, welding and feed rates. One-direction, one-pass operation was worked out. Tables, photographs, diagram. 18 ref.

13509* Effectively Weldable Cast Steel of High Strength. **Khorosho svarivaemaia litaia stal' povyshennoi prochnosti.** (Russian.) I. P. Krianin. *Svarochnoe Proizvodstvo*, 1955, no. 7, July, p. 7-9.

Types of defects and the micro-structure of welded joints and seams; effect of types of heat treatment for base metals and seams; and of alloying elements on strength and hardness. Micrographs, table, graphs, photographs. 8 ref.

13510* Ceramic Fluxes for Automatic Arc Welding. **Keramicheskie fliusy dlia avtomaticheskoi dugovoi svarki.** (Russian.) K. K. Khrenov and D. M. Kushnerev. *Svarochnoe Proizvodstvo*, 1955, no. 7, July, p. 13-16.

Effect of fluxes on strength, hardness, and micro-structure, of base metal and surface. Micrographs, photographs, tables. 7 ref.

13511* Heat-Treatable Hard-Alloy Welding Electrodes for High Speed Tools. **Anlöpningshårdnande hårdsvetslegering för högavverkande skärverktyg.** (Swedish.) Tore Norén. *Svetsaren*, v. 19, no. 4, 1954, p. 8-14.

Physical and mechanical properties; crystal structure and composition; method of heat treatment; field of application. Graphs, micrographs, photographs. 7 ref.

13512 Arc Welding for Small-Lot Production. III. Tooling the Job. Arthur H. Allen. *Tool Engineer*, v. 35, Aug. 1955, p. 89-93.

Design and use of jigs and fixtures; costs. Photographs, tables.

13513* Notes on the Role of Hydrogen in Metal Arc Welding. P. D. Blake. *Welder*, v. 24, Jan.-Mar. 1955, p. 14-20.

Review of the literature on the deleterious effects of H upon weld metal. Photographs, diagram. 11 ref.

13514 Nomograph for Weight of Electrode Metal Required. Tyler G. Hicks. *Welding Engineer*, v. 40, Mid-June 1955, p. 27.

Chart for making quick estimates of the wt. of electrode metal required for a given joint. Nomograph.

13515 Material Characteristics as Related to Resistance-Welding Current and Pressure. *Welding Engineer*, v. 40, Mid-June 1955, p. 47.

Nomograph relating relative hardness and electrical conductivity of various alloys to current and pressure. Nomograph.

13516 How to Figure Diameter or Length of Brazing Wire. *Welding Engineer*, v. 40, Mid-June 1955, p. 42A.

A guide for selecting the proper alloy wire size for brazing tubular or linear joints of given specifications. Nomograph, diagrams.

13517 Filler Metals for Joining. Orville T. Barnett. *Welding Engineer*, v. 40, Aug. 1955, p. 30-32.

Describes the E6010 d.c. electrode and the more versatile E6011 a.c. or d.c. electrode and their applications. Tables, diagrams, photograph. 2 ref.

13518 Copper Contacs Formed Faster. Corwin S. Selby. *Welding Engineer*, v. 40, Aug. 1955, p. 40-41.

Formerly "hogged" from solid ships, contacts are made faster, cheaper, and better by brazing and soldering. Photographs.

13519 Inert-Gas Welding in the Aircraft Industry. J. M. Thompson, Jr. *Welding Journal*, v. 34, July 1955, p. 635-640.

An outline of several applications of inert-gas welding of Al, Mg, Ti, and stainless steel. Photographs.

13520 Hand Welding 5-Chrome and 9-Chrome Pipe. W. J. Lester. *Welding Journal*, v. 34, July 1955, p. 641-647.

An alternative procedure which allows cooling from the preheat temperature to ambient conditions after a ½-hr. post-heat at 500 F, followed by stress-relieving at a more convenient time. Photographs, diagrams, graphs, tables, micrographs.

13521 Inert-Gas-Shielded Tungsten-Arc Spot Welding. C. A. McClean. *Welding Journal*, v. 34, July 1955, p. 648-656.

Investigation of variables, recommended procedures, comparison with resistance spot welding, and job applications. Photographs, diagrams, graphs. 5 ref.

13522 Titanium Alloy Weldability and Correlated Metallurgy. H. L. Meredith and C. W. Handova. *Welding Journal*, v. 34, July 1955, p. 657-672.

Extensive tests indicates α and α-β Ti alloys are readily weldable by the inert-gas W-arc process. Photographs, graphs, micrographs, diagrams, tables.

13523* Fabrication of Water Turbine Components. F. Buckley. *Welding and Metal Fabrication*, v. 23, July 1955, p. 236-243.

Advantages and disadvantages of welding cast, rolled, or forged forms into water turbine components. Photographs.

13524* The Economic Application of Automatic Arc Welding Equipment. J. A. Lucey. *Welding and Metal Fabrication*, v. 23, July 1955, p. 251-257.

Outlines the methods which must be employed to secure the max. economies with automatic welding. Graphs, photographs.

13525* Automatic Control of Machine Arc Welding. F. Hirschmann. *Welding and Metal Fabrication*, v. 23, July 1955, p. 262-264.

Equipment for arc length control, which is non-electronic, makes the welding torch follow the profile of the workpiece and also moves the torch towards the workpiece and away from it, at the start and end of the weld. Diagrams, photographs, graphs, tables.

See also:

12907 (tin recovery from soldered metal scrap)
13147 (strength of welded structures)
13325 (inspection of welds)

WOOD AND FOREST PRODUCTS

13526* Moulding Powder Filler From Jute Sticks. P. K. Ghosh, T. Bhowmik, and P. K. Bose. *Journal of Scientific & Industrial Research*, v. 14, sec. B, Mar. 1955, p. 121-123.

Use of wood flour, made from jute sticks after removal of fiber, as a filler in molding powders. Tables. 4 ref.

13527* Investigations Concerning the Possibilities of Reducing the Drying and Conditioning Time of the Test Sheets at Rapid Testing of Chemical Pulp. (English.) Torsten Ekstam. *Paperi ja Puu*, v. 37, no. 7, July 1955, p. 265-272.

Experiments showed that the drying time for test sheets can be reduced from 2-hr. to about 40 to 50 min. without any appreciable change in the strength values obtained provided that one blotter is removed from the test sheet before drying in a hot drum. Tables, graphs. 2 ref.

13528* The Radiography of Spot Welds in Light Alloy Sheets. N. K. Gardner and E. A. Redwood. *Welding and Metal Fabrication*, v. 23, July 1955, p. 245-249.

Physical examination of the method, equipment, radiographic technique, interpretation of radiographs, and costs. Graphs, photographs, radiographs. 2 ref.

Books and Miscellaneous Publications

13529 Pulp and Paper Manufacture. J. Newell Stephenson, editor. v. IV. Auxiliary Paper Mill Equipment. 732 p. 1955. McGraw-Hill, New York. (TS1105 J66p)

Instrumentation; pumping apparatus; power generating equipment; water treatment and control; maintenance.